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ON Thursday, the conference committees of the two iron and metal exchanges in this city agreed on a plan for their consolidation. As yet, their formal report has not been made, and the details of the arrangement arrived at are not known.

IT is reported that Messrs. CARNEGIE Brothers, the Pittsburg steel and iron manufacturers, have made an agreement with the Ontario Central Railroad, and other parties interested, to carry out prospect-work on two iron ore deposits at Wallaston, Ontario. The CARNEGIES have paid $5000 cash, and are allowed to make explorations with the diamond drill, with the option of buying one mine for $700,000, and the other for $100,000, figures which seem very high.

MR. HENRY G. PEARSON, Post-Master, announces that, under arrangements recently made, letters directed to this city are separated in transit, and those on which the box-number forms part of the address are placed in separate packages, so that time in distributing them is saved. In order to secure proper attention, and in many instances enable us to save a week in publication, we would beg our correspondents to address, in the future, all letters to our Post-Office Box, **1833.**

WE regret to announce the sudden death, at San Luis Potosi, Mexico, of Mr. FRANCIS A. LOWE, a frequent and valued contributor to the pages of the ENGINEERING AND MINING JOURNAL. Mr. LOWE was a graduate of the Sheffield Scientific School, and completed his education as a mining engineer and metallurgist at Freiberg. He was for years at Silver Islet, Lake Superior, and later at Batopilas, Mexico. He died at the age of thirty-seven, when on a professional trip, at a time when his accumulated experience was beginning to open out to him a promising career.

SWANSEA, too, is invaded by the corporation craze, two of the smelters of that great metallurgical center passing out of the hands of a private firm into those of a company. VIVIAN'S nickel and copper works, with the Norway mines, were capitalized at £320,000 some weeks since; and now the spelter works of Messrs. RICHARDSON & Co., with mines at Bergamo, Italy, follow with a capital of £105,000. Have Swansea smelters been getting too rich, or do they imitate the way of many of our Western operators, of "getting out" at the first intimation of hard times ahead?

A SIGNIFICANT statement was recently made at a meeting in London of the La Plata Mining Company, of Leadville, which does a considerable share of the smelting of ores in that district. The chairman reported that during the last three months the company has been losing 10 shillings, or nearly $2.50, per ton, a result that is attributed to mismanagement. It is well known that at least one of the smelters, conducted by a gentleman of great experience, is working at very low figures, the cost being rumored to be below $7 per ton. The management professes to have assurances that there is not any discrimination in freights against Leadville smelters.

THE Bethlehem Iron Company has struck out in a new direction. It has acquired mines, reported to be very great deposits of pure and uniform specular ore, in the island of Cuba, at a distance of four miles from the coast, and, by a line to be run, fifteen miles from Santiago, a good port. The ore is so readily accessible that it can be mined by open-cut work, and can be loaded directly into the cars. Until the railroad has been built to the port in question, the ore will be transferred by lighters at the nearest point on the coast to the vessels. With striking shortsightedness, the Spanish government promptly proposed to put on an export duty of 40 cents per ton; but we understand that this has been abandoned. If the deposits are all that we hear them reported to be—and our information comes from a trustworthy source—then these Cuban mines may be expected to rival the famous Bilbao mines. It is estimated that the ore can be put on board cars at mines at a maximum cost of 50 cents per ton.

IF the rumors are true that the lake producers have made contracts for additional shipments abroad, carrying the total, including the 2,750,000 pounds noted in our last, to 10,000,000 pounds, the metal is destined to take a firmer position. As yet the statement that such heavy transactions have taken place is not confirmed, but we are in a position to state that negotiations have certainly been going on. Rumor places the price at 16 cents; but it is a little doubtful whether some concessions would not be exacted by buyers of such large lots. So far as we are able to learn, no Western producers have this time entered into the pool, though ultimately probably some of the largest will find it expedient to co-operate with the lake producers in some way. As we pointed out in our last issue, heavy export sales put quite a different face on the status of the metal. They effectually put a quietus on all such talk as we have been hearing of late, that the great lake companies would kill off the small ones, or that they would put prices to such a figure that the new Western enterprises would be crowded to the wall. They have adopted the conservative policy which their relations with consumers seem to dictate. By clearing away their surplus, the lake companies will be in a position to make a price for their next home contracts, which will not be much, if any, lower than those made at the beginning of the year. The coming months will show to what extent other brands have succeeded in gaining a foothold among consumers, and this will be reflected by lesser requirements of the standard brand. The inducement as held out during the past months of a difference in price between lake and other brands, ranging from one to two cents per pound, is alone responsible for the steady appearance on the market of small lots of Lake copper, which have been selling down from 18 cents, until this week we hear of transactions based on 17⅛@17¼ cents, it being difficult to place copper at the latter figure. In the aggregate, this movement must have been quite important, and the early future will show whether or not it has injured the quality of manufactured goods to any appreciable extent. Our manufacturers have been spoiled by the good quality of Lake, and in rolling have become accustomed to subjecting the metal to the severest treatment without any fear of disastrous results. They can not do this with other copper, and we have reason to believe that it will take some time before our rule-of-thumb foremen know how to handle other grades. With such a difference in prices, we are convinced that it must be profitable to use phosphorus, manganese, and other compounds whose action in promoting density of casting and in improving the mechanical qualities of the metal is well established. The

exceptional quality of our raw material has aided our manufacturers wonderfully. They must now learn how to use for many purposes copper which anywhere else would be rated very high, but which does not quite come up to Lake. Upon our refiners devolves a very important duty—that of watching ceaselessly over the uniformity of their product, so as to gain the confidence of consumers. They have made strong and well-directed efforts in this direction, and some of them are so anxious to avoid all possibility of danger to their product that they decline to allow raw material containing certain impurities, notably arsenic, to enter their works. Smelters in the West should thoroughly understand this. It is largely their fault when, by undue anxiety to reach a high-grade shipping product by as few smeltings as possible, they render its quality almost irremediably bad.

Nothing but earnest co-operation on the part of smelters, refiners, and manufacturers can place the new brands of copper on the footing which they deserve to occupy, and prevent a depreciation in the quality of manufactured goods, the consumers of which are accustomed to so high a standard.

OFFICIAL STATEMENTS AND REPORTS.

FRANKLIN, LAKE SUPERIOR.

The annual report of Treasurer D. L. Demmon for 1882 shows a surplus of $244,330.37 January 1st, 1883, against $116,842.65 January 1st, 1882, including the rock broken in the mine, which, although valued at say $30,000, is not reckoned this year. Since January 1st, the loan account, $20,000, has been paid from sales of copper, and the company is now, for the first time since given up by tributers, entirely free from debt for borrowed money, owing only its regular business drafts for labor, supplies, etc. The question of a dividend has been considered; but so far the directors have refrained from paying one, because to do so would necessitate the borrowing of the entire amount paid, as the surplus consists mostly of copper and supplies, the amount of cash on hand being only about sufficient, with receipts from present sales, to meet the regular running expenses of the mine. The unsettled condition of the tariff at the time the report was written also acted as a deterrent. Further consideration of the matter will probably come up at the annual meeting. While no dividends have ever been paid, the treasurer congratulates the stockholders on an appreciation of the stock since operations were commenced, eight years ago, from $3@3.50 to $12@$12.50 per share, besides interest at 12 per cent per annum on the amount invested, "which investment," the report says, "surely is not a bad one, considering that no money has ever been called from the stockholders, and that the mine was considered played out at the time work was commenced." During the year, 148,042 tons of rock were hoisted and treated, at a cost of $2.35 per ton; number of pounds of mineral per ton, 26·86; number of pounds of ingot per ton, 22·02; average yield of ingot from mineral, 82·22; amount of ingot produced, 3,264,120 pounds, or a gain over 1881 of 585,323 pounds; yield per ton of rock, 1·168 per cent mineral, being a gain over 1881 of 0·26 per cent in richness of ore. The cash receipts and expenses for 1882 were:

Cash on hand January 1st, 1882	$25,588 58
Sale of copper in 1882, 2,778,714 pounds, at 18·174c	505,007.61
Loans	219,135.37
Sale of silver	880.04
Sale of supplies at mine	736.32
Interest account	523.19
Rebate on freight	659.35
Total	$752,530.46

CONTRA.

Cash paid loans	$295,855.54
Drafts	364,924.93
Smelting	38,241.10
Freight and storage	14,310.02
Brokerage	2,619.09
Interest	5,554.44
Expense, insurance, taxes, etc	8,418 52
Mine account, Nashua Iron and Steel Company (old claim)	694.16
Cash on hand January 1st, 1883	21,912.66
Total	$752,530.46

The assets and liabilities January 1st, 1883, were:

ASSETS.

Copper on hand, 1,315,858 pounds, at 18c. (840,000 pounds of which have been sold for early deliveries.)	$236,854.44
Cash on hand	21,912.66
Total	$258,767.10

LIABILITIES.

Loans, bills payable	$20,000.00	
Drafts outstanding	27,474.30	
Due for smelting	7,659.57	
Due for freight	2,771.73—	57,905.60
Surplus assets at Boston		$200,861.50
Supplies at mine	$79,880.55	
Less liabilities at mine	36,411.68—	43,468.87
Entire resources over liabilities		$244,330.37

The report of Superintendent J. Vivian notes the progress of development and improvements of the year, and calls attention to the necessity of soon providing coal for fuel, wood having become scarce. The prospects of the mine are as good for 1883 as they were January 1st, 1882.

CONGLOMERATE, LAKE SUPERIOR.

Under date of March 12th, Mr. Henry C. Davis, President of the Conglomerate Mining Company, of Philadelphia, reports that during the year 1882 the company did 2001·5 feet of sinking of shafts and winzes, extended the levels of the mine 3253·4 lineal feet, and stoped 2699·82 fathoms, the total openings to the end of the year being 10,943 feet. The ground on the lower levels of No. 2 shaft looks promising and in other parts of the mine the prospects are encouraging. The average wages have been as follows:

	1882.	1881.
Contract miners (per month)	$56.68	$56.42
Company miners (per month)	45.00	46.54
Underground laborers (per month)	38.74	37.31

Average cost of underground work:

	1882.	1881.
Sinking, per foot	$12.31	$14.75
Drifting, "	10.52	11.11
Stoping, per fathom	9.23	17.63

The Conglomerate, which is now the most conspicuous in Keweenaw County, is rapidly approaching the time when the heavy outlay for development-work and surface improvements will be completed. The heaviest expenditure was for the new mill, the stamps of which are now erecting, and for the railroad to it, and the last of the heavy items of new construction account, the permanent hoisting plant, is now contracting for. During the year, the company has stamped in its old mill 41,104 tons of rock, at a cost of $1.06⅛ per ton. Mr. Davis says: "The yield of mineral copper was 991,375 pounds, equal to 1·20 per cent, a very satisfactory result, considering that the large proportion of rock stamped was from openings. In my last annual report, $3 was taken as the maximum cost per ton of rock. The experience and expenses of the past year, considering the thorough equipment we are making, justify the statement that the rock can be handled for $2.25, and may be handled for $2 per ton."

The expenditures for the year were:

Underground cost		$142,764.68
Surface and incident to the mine		110,673.12
Construction account		134,668.41
Debit of team account		1,712.23
		$389,818.44
Credited by		
Merchandise profit	$14,322.85	
Supplies profit	10,963.14	
Wood account profit	740.10	
Repair account profit	1,358.82—	27,384.91
Total for 1882		$362,433.53
Before reported for 1881		360,467.98
Total to December 31st, 1882		$722,900.91
Less copper produced		173,132.98
Making net cost of openings and equipment		$549,767.93

The resources of the company include cash, $50,311.42; balance of last installment, $71,846; copper at mine, $20,000; merchandise, supplies, etc., at mine, $72,906.44; a total of $215,063.86. The liabilities, including bills payable, $10,895; loans, $7000; agent's drafts, $4703.72; wages, $7000, and unpaid bills, the whole aggregating $34,976.23, leaving a balance of resources of $180,087.63.

PEWABIC, LAKE SUPERIOR.

The annual report of the Pewabic mine, which adjoins the Quincy on the south, is not encouraging. During the year, a large amount of development-work has been done in the 26th, 27th, 28th, 29th, and 30th levels, uncovering hardly any thing but poor ground, the expenditure in this work being $47,950.91, including 1500 feet of drifting on the main lode at $15.80 per foot, 55 feet of drifting on the west lode at $12, 126·5 feet of cross-cutting at $13.50, 375 feet of winzes at $15.80, and 375 feet of shaft sinking at $18.22 per foot. In the deepest workings, the 30th level, south, the ground has been improving and the mine is showing better.

The agent, Mr. J. Vivian, says of the future: "At this writing, it is impossible to predict, with the least degree of certainty, what can be done for the ensuing year in the way of product; for as you are aware, our productive ground, that will pay to stope, is getting very short, and unless we find in some of the lower levels remunerative ground, I can not see how the present product can be kept up. You can not fail to notice in the map of the mine, that there is a large amount of ground opened. If it was all as productive as what we had above the 25th level, it would be sufficient to supply our present hoisting facilities for over two years, without opening another foot in any direction. When the company purchased the new territory, it was the opinion of every body that knew any thing about such matters, that it was a prize, and nothing short of large dividends would be in order at an early day; and had the lode continued to be as productive as it was when we started on the new ground in November, 1879, long ere this these expectations would have been realized. Being fully persuaded that the lode in the new territory would be at least as productive as it has been in the old ground for many years past, we started to put the mine, mill, machinery, and surface in the best possible condition for economical working; to do this, it has cost a large amount of money; but, had the mine continued to yield as in former years, all these improvements, repairs, etc., would have been paid for out of the profits made, and the last assessment never heard of."

The mine is fairly well equipped. During 1882, $18,193.77 were expended in buildings, $6353.40 in surface improvements, $12,206.30 for the stamp-mill, including $2036.45 for a duplex pump with a capacity of 2000 gallons per minute, and $45,920.81 for tools and machinery. This includes $6723 for 17 Rand drills, $5738.72 for a duplex air-compressor, $4575 for air-pipe and labor, etc., $2525 for two Blake crushers, and $14,163.85 for repairs to the man-engine, which is in operation to the 16th level. Considerable change and improvement have been made in the hoisting-engine, by sliding the pinion-wheel on the side which detaches the engine from the hoisting-drum and putting two band-brakes on said drum, by which the skip is lowered while the engine is standing still. With this arrangement, the hoisting capacity has been greatly increased and the engine has been saved from more than half of its usual wear and tear. The total of extraordinary expenditures, including the dead-work in the mine, has been $130,625.22.

The following is a statement of the production and cost of stamping:

Number of tons of rock hoisted in 1882, 74,042.
Number of tons of rock stamped, 63,592.
Cost per ton, entire treatment, $3.03.
Pounds of mineral, per ton hoisted, 24·16.
Pounds of ingot, per ton hoisted, 20·02.
Percentage of ingot in mineral, 82·88.
Total amount of ingot produced, 1,482,664 pounds.
Tons of rock stamped, per cord of wood, 10·84.
Cost of stamping, per ton of rock, 0·64·97.

In 1881, 60,427 tons were stamped, giving a yield of 1,872,878 pounds, or 1·92 per cent.

In 1882, 63,592 tons were stamped, giving a yield of 1,482,664 pounds, or 1·51 yield, showing a decrease of 0·41 per cent in yield, and an *increase* in amount stamped of 3165 tons.

The cash receipts foot up to $678,928.14, including cash on hand January 1st, 1882, $26,557.97; sale of 1,328,496 pounds of copper at a price of 18·35c., $243,777.05; loans, $349,441.53; and assessments, $57,528. The payments were $358,916.53; agent's drafts, $254,802.66; smelting and freight, $28,324.19; and other miscellaneous expenditures, leaving cash on hand January 1st, of $16,246.96.

The assets include 572,509 pounds of copper, valued at 18 cents, or $103,051.92, and assessments uncollected, $22,472. The liabilities include loans of $89,500, outstanding drafts, etc., aggregating $114,088.10, leaving a balance of assets at Boston of $27,682.48, to which are added excess of supplies at mine over liabilities of $32,841.52, making the total balance of assets over liabilities $60,524.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

RECENT RULINGS AND DECISIONS OF THE GENERAL LAND-OFFICE.

Oil Lands.—Oil lands may be located and patented under the placer mining laws.

Expenditures on Mining Claims.—The value of expenditures upon mining claims is to be measured by the ruling prices of labor and material in the locality where the claims are situated.

Rehearings.—The rule of law is well settled that a new trial will not be granted on the ground that the verdict was against the weight of evidence, if there was evidence on both sides which was contradictory. This rule was applied in a mining case upon an application for a rehearing.

After a witness in the hearing of a mining contest has given his testimony, taken by consent by a short-hand reporter, and by stipulation it has been agreed that the testimony shall be considered the same as if it had been reduced to writing and signed, and after the testimony has been taken at the local office and has been considered and the case decided in the General Land-Office, it is not competent, on a motion for a rehearing, to introduce affidavits to show that the witness testified differently from what the record shows, or that he did not make certain statements which the record shows he did make.

Newly Discovered Testimony.—After a party has had a fair and full hearing before the local land officers, and the testimony has been considered and the case decided in the General Land-Office, affidavits which contain statements of facts on a point which was material, and which statements are merely cumulative, and no sufficient reason is shown why the makers of such affidavits were not produced at the hearing before the local office, such affidavits will not afford a basis for a rehearing on the ground of newly-discovered evidence.

Publicity of Surveyor's Reports on Placer Claims.—Under circular issued originally under the date of September 22d, 1882, with special reference to placer claims, by the Commissioner of the General Land-Office and approved by the Secretary of the Interior, no placer claim is granted unless favorably reported upon by a deputy surveyor, and approved by a surveyor-general. The Commissioner of the General Land-Office now rules that an attorney interested in a case can not see this report of the deputy surveyor, with which ruling much fault is found by attorneys practicing before the department, because it leaves them in the dark as to any errors that may have been found; and to obtain this necessary information causes unnecessary delay and additional expense.

The Conformity of Placer Claims with Public Land Surveys.—The following points were made in a case where parties attempted to secure a placer patent for a location upon surveyed land of twelve thousand feet, nearly all of which is the bed of a river, and includes only a small quantity of surface ground along its banks:

The first law authorizing the patenting of placer claims was the act of July 9th, 1870, which expressly states that the location made thereunder shall conform to the United States surveys. The act of May 10th, 1872, which is incorporated into Section 2331, United States Revised Statutes, provides, among other things, that all placer mining claims thereafter located upon surveyed lands "shall conform as nearly as practicable with the United States system of public land surveys, and the rectangular subdivisions of such surveys; . . . but where placer claims can not be conformed to legal subdivisions, survey and plot shall be made as upon unsurveyed lands. . . ." There were many tracts of surveyed land which could not be taken as placer claims so long as the locations had to conform to the public surveys, on account of the prior rights of other persons, especially lode claimants, to portions of the legal subdivisions embracing such tracts, and the purpose of the provisions of the act of 1872 was evidently to enable qualified parties to locate and obtain patents for the portions not previously appropriated or reserved. The privilege granted to lode claimants of taking their surface ground without regard to the public surveys, was never extended to placer claimants. The division of 40-acre tracts into 10-acre lots was authorized for the purpose of enabling the placer locators to conform to the surveys. The Commissioner says: "It can not be claimed that a location of a narrow strip of land, 12,000 feet long, extending through three sections (as this does), conforms 'as nearly as practicable' to the rectangular subdivisions of the public surveys, unless the adjoining land had been previously appropriated or reserved, which is not the fact in the present case. If such a construction was given to the provisions of the act of 1872, under consideration, they could in nearly every case be disregarded and rendered ineffective by the placer claimants. The locations would be made so as to cover only the valuable lands, and leaving the adjoining tracts in such a condition and situation as to make it impossible, in many cases, to dispose of them. In another case, this office says to a surveyor-general, after quoting the above-mentioned provisions of the act of 1872, that 'the location of a placer mine upon surveyed public lands made after May 10th, 1872, should embrace legal subdivisions of the public land, where the same can be done without interfering with the rights of other *bona-fide* mineral, agricultural, or other claimants in the same tract.' The only construction of the language referred to which is consistent with the context of the act and the general intention of Congress, as expressed in the laws upon the same subject, is, that the placer locations upon the conveyed lands shall conform to the public surveys in all cases, except where this is rendered impossible by the previous appropriation or reservation of a portion of the legal subdivision of ten acres upon which the claim is situated.

"There appears to be another serious objection to the location in question. It covers the bed of a river for a long distance; and should the applicant obtain a patent, he would acquire the right to and control over the water in that portion of the stream lying within his claim. It has been the policy of the government to withhold patents for water rights, and leave them to be determined and protected by the local courts. It was clearly not the intention of Congress to allow a large river for two or three miles, with only a few feet of ground along its banks, to be patented as a placer claim."

THE NEW WYOMING VALLEY SALT REGION.

So much has been written and said during the past few months by persons not familiar with the salt industry on the Wyoming Valley salt deposits that the following extracts from a letter by Mr. Sylvester Lewis, of Wyoming, to the Rochester *Morning Herald*, will be perused with more than passing interest:

In the first place, I will state that there is an inexhaustible bed or rock of salt extending through the entire valley at an average depth of about 1200 feet. The rock or deposit has an average thickness of about seventy feet, and is known to be perfectly pure, and in regard to the purity of the brine procured from this deposit, it will depend in a great measure upon the condition and purity of the fresh water which is run into the wells for the purpose of dissolving the rock. In regard to its strength, it can be procured and brought to the surface of a uniform strength or at complete saturation provided the water is allowed to remain in the wells a sufficient length of time to become saturated. The advantages the valley possesses over other salt-producing localities are many, and the first and the one most to be relied upon is the strength and purity of the brine. In order to give the reader a more perfect knowledge of the subject, I will make a comparison of the brine produced at Syracuse with that of the Wyoming Valley. Hon. George Geddes, superintendent of the Onondaga salt springs, as far back as 1867, when the brine of those springs was known to be much stronger and purer than now, said, as can be seen on page three of his answers to interrogations of the constitutional convention which assembled at that time, that it required an average of fifty gallons of brine to make a bushel of salt of fifty-six pounds weight. Professor Lattimer, of the University of Rochester, in 1879 made an analysis of brine taken from the first well put down in the Wyoming Valley, which is situated one half-mile south of the village of Wyoming. The professor, in closing his report, says that twenty-four gallons of this brine will make a bushel of salt of fifty-six pounds weight. In regard to solar evaporation, Mr. Geddes, in his report to the constitutional convention, says that a vat sixteen by eighteen feet was capable of making fifty bushels or ten barrels of salt in an average season; whereas the Wyoming Valley Salt Company made in the season of 1881 twenty-two barrels of salt under cover of sixteen by eighteen feet. The size of salt-vats is known by salt manufacturers by the size of the cover, and is generally spoken of as so much salt having been made to the cover. Now, in regard to the manufacture of salt at Saginaw compared with that of the Wyoming Valley, I will refer to a statement of the Hon. Thomas G. Alvord, made to a joint committee of the Legislature February 17th, 1876. In answer to a question put by the committee, "How does the purity of the Godrich wells compare with that of the Saginaw wells?" Mr. Alvord says, "The Godrich water is very nearly both pure and saturated; ours is impure, and measures less than seventy degrees of salinometer. The Saginaw wells are very much inferior to ours." So that, if we are to take the statement of Mr. Alvord as correct, the same difference exists in regard to the strength and purity of the brine at Saginaw, compared with that of Wyoming, as exists between the Onondaga salt springs and the brine of the Wyoming Valley. The only difference in the expense of manufacture of salt at Saginaw and Syracuse is, that the Saginaw manufacturer is using the refuse from the manufacture of lumber; but the timber of Michigan is fast being used up, and as soon as Saginaw has to fall back upon coal as a fuel, it will be in the same predicament that Syracuse is now in, and both in time will have to succumb to the rich saline deposit of the Wyoming Valley. It can not be otherwise, as the same amount of fuel and labor that would make one bushel of salt at Saginaw or Syracuse will make two bushels at any of the works of the Wyoming Valley, and of a much superior quality. In regard to the salt-fields of Canada, compared with those of the valley, there is no difference in strength or purity of brine, and the Canadian manufacturer has to depend wholly upon wood.

The strongest proof that the Wyoming Valley is to be the great salt center of the world is the fact that the manufacturers of salt from all parts of the world are making tracks toward the valley. One large manufacturer of salt in Canada has already purchased a site on the line of the Rochester & Pittsburg Railroad, near the depot at Warsaw, and will soon begin the erection of large works. This is evidence that the salt manufacturers of Canada are satisfied that the Wyoming Valley is to supersede all other salt-producing localities. In regard to available places for putting down wells, there are hundreds of them in the valley, many of them superior to any yet located in regard to water and fuel supplies The Rochester & Pittsburg Railroad will soon be extended to its large coal-fields, and I am warranted in saying that in a very short time coal will be laid down in the valley for $2.50 a ton. In regard to transportation, we need have no fear, as the Rochester & Pittsburg Railroad traverses the entire length of the valley, and the Lackawanna road crosses the valley only a few miles north of the center of the great salt-deposit. These roads have connections east, west, north, and south, and have ample facilities for the transportation of our salt. The interests of the railroad companies are identical with the interests of the salt manufacturers. Both of these companies are owners of large coal-fields, and they want to sell their coal and carry our salt; and if the managers of these roads are the smart men I take them to be, they will put such low figures on coal and such reasonable rates on freight as will prevent any judicious capitalist from putting money into competing lines. The Rochester & Pittsburg Company, to my knowledge, has done all that could be reasonably expected to assist in developing the salt interests of the valley.

OUR PRODUCTION OF PIG-IRON IN 1882.

Mr. James M. Swank, Secretary of the American Iron and Steel Association, has just published the complete statistics of the production of pig-iron, his figures standing as follows:

PRODUCTION OF ALL KINDS OF PIG-IRON IN 1880, 1881, AND 1882, BY STATES.

States.	Net tons. (Tons of 2000 pounds.) 1880.	1881.	1882.
Maine	3,578	4,400	4,100
Vermont	1,800	2,796	1,210
Massachusetts	19,017	18,318	10,335
Connecticut	22,583	28,483	24,342
New York	395,361	359,519	416,156
New Jersey	170,049	171,672	176,805
Pennsylvania	2,083,121	2,190,786	2,449,256
Maryland	61,437	48,756	54,524
Virginia	29,934	83,711	87,731
North Carolina	.....	800	1,150
Georgia	27,321	37,404	42,440
Alabama	77,190	98,081	112,765
Texas	2,500	3,000	1,321
West Virginia	70,338	66,409	73,220
Kentucky	57,708	45,973	66,522
Tennessee	70,873	87,406	137,602
Ohio	674,207	710,546	698,900
Indiana	12,500	7,300	10,000
Illinois	150,556	251,781	360,407
Michigan	154,424	187,043	210,195
Wisconsin	96,842	102,029	85,859
Missouri	105,555	109,799	113,644
Minnesota	3,520	7,442	8,126
Utah	.....	.....	57
Colorado	.....	6,396	23,718
Oregon	5,000	6,100	6,750
California	.....	4,414	987
Washington Territory	.....	1,200	.....
Total	$4,295,414	$4,641,564	$5,178,122

This output was distributed, as to the fuel used, as follows:

Kinds of fuel.	Net tons. (Tons of 2000 pounds.) 1880.	1881.	1882.
Anthracite	1,807,651	1,734,462	2,042,138
Charcoal	537,558	638,838	697,906
Bituminous	1,950,005	2,268,264	2,438,078
Total	4,295,414	4,641,564	5,178,122

In the following States and territories, more than 20,000 net tons of harcoal pig-iron were produced annually:

CHARCOAL PIG.

States.	Net tons. (Tons of 2000 pounds.) 1880.	1881.	1882.
Connecticut	22,583	28,483	24,342
New York	27,844	30,467	30,716
Pennsylvania	43,374	51,908	49,975
Maryland	33,050	27,626	28,277
Virginia	14,043	19,038	26,133
Alabama	37,737	44,221	55,541
Kentucky	21,174	16,778	17,165
Tennessee	16,675	19,046	37,611
Ohio	69,190	66,169	58,654
Michigan	154,424	187,043	210,195
Wisconsin	42,913	47,702	55,369
Missouri	15,769	43,241	54,327

Of pig produced with bituminous coal or coke, the following States were producers:

BITUMINOUS COAL AND COKE PIG.

States.	Net tons. (Tons of 2000 pounds.) 1880.	1881.	1882.
New York	.....	6,703	.....
Pennsylvania	801,817	925,525	945,635
Maryland	5,387	.....	.....
Virginia	15,891	64,673	61,598
Georgia	20,044	24,000	26,875
Alabama	39,453	53,860	57,224
West Virginia	67,093	65,209	73,220
Kentucky	36,534	29,195	49,357
Tennessee	54,198	68,360	99,991
Ohio	605,017	644,377	640,246
Indiana	10,500	7,300	10,000
Illinois	150,556	251,781	360,407
Wisconsin	53,929	54,327	30,490
Missouri	89,786	66,558	59,317
Colorado	.....	6,396	23,718
Total	1,950,205	2,268,264	2,438,078

The make of anthracite is naturally much more restricted in territory, as the following table shows:

ANTHRACITE PIG.

States.	Net tons. (Tons of 2000 pounds.) 1880.	1881.	1882.
Massachusetts	9,155	5,958	.....
New York	367,517	322,349	385,440
New Jersey	170,049	171,672	176,805
Pennsylvania	1,237,930	1,213,353	1,453,646
Maryland	23,000	21,130	26,247
Total	1,807,651	1,734,462	2,042,138

The production in some of the principal districts was as follows:

		1880.	1881.	1882.
Pennsylvania.	Lehigh Valley	544,987	560,190	609,338
	Schuylkill Valley	306,926	309,049	342,701
	Upper Susquehanna	168,128	125,785	201,367
	Lower Susquehanna	217,889	218,329	300,240
	Shenango Valley	215,313	198,968	264,078
	Alleghany County	300,497	385,453	358,840
	Miscellaneous coke	286,007	341,104	322,717
	Charcoal	43,374	51,908	49,975
Ohio.	Hanging Rock coke	60,316	77,500	77,364
	Mahoning Valley	226,877	245,737	258,478
	Hocking Valley	85,719	88,146	78,770
	Miscellaneous coke	232,105	232,994	225,634
	Hanging Rock charcoal	64,854	61,487	55,546
	Miscellaneous charcoal	4,336	4,682	3,108

QUICKSILVER IN BLENDE.—*Die Oesterreichsche Zeitschrift für Berg- und Hütten-Wesen* announces that an interesting discovery has just been made at the zinc-works of the Vieille Montagne Company, at Oberhausen. It has been found that quicksilver was conveyed by the gases which passed from the Hasenclever furnace into the lead chamber. A special furnace was built for extracting the quicksilver, and during 1882 several tons were obtained. It is believed that all the blendes of the Rhine district contain quicksilver, which may be extracted in paying quantities.

THE ELECTRO AMALGAMATION OF GOLD ORES.

English technical journals have, during the past few weeks, published a good many statements, wild on the face of them, about a new gold amalgamating process. The first fairly intelligent and critical account has just been given by *Engineering*, which therefore deserves consideration:

In gold mining from quartz reefs, the rock is, as is well known, reduced to powder by means of stampers, and is then carried by a stream of water over the surface of mercury. In consequence of the strong affinity between gold and mercury, as soon as a particle of the former comes into contact with the latter, it is absorbed and amalgamated, while the quartz fragments with which it is associated float on the surface of the metal, and are carried away by the stream of water. But besides gold, many other substances, such as oxygen, sulphur, and arsenic, have an affinity, more or less active, for mercury, and many if not all of them are found mixed with the gold in certain deposits. When an ore containing these elements is passed over mercury to eliminate the gold, the other bodies are also retained, and being of much less specific gravity than the mercury, they float on its surface, combining with its upper stratum, and adhering with a persistence that can not be overcome by any stream of water that is not of sufficient force to carry off not only the quartz, but also the gold and part of the mercury. This result is termed by the miners "sickening," and involves great loss of gold, because, as soon as the surface of the mercury becomes "sick," the gold no longer comes actually into contact with it, and the greater part escapes. The remedy hitherto employed has been to remove the sick mercury at frequent intervals and distill it, exactly as water is distilled; but this of course involves additional expense, and in many mines the extra cost, and the loss which takes place, in spite of all care, are sufficient to convert a profit into a loss.

Lately, Mr. Richard Barker, F.G.S., has brought out a new method of recovering sick mercury, or rather. of preventing it from becoming sick. According to his process, he connects the mercury with the zinc pole of a galvanic battery or of a dynamo machine, and the water flowing over it with the copper pole of the same generator. Thus he gets a current of electricity flowing from the water to the mercury. The result is certainly very surprising: as soon as contact is made, the black scum accumulated upon the surface of the mercury retreats from the electric terminal as if driven by a steady blast of air, and the bright surface of the metal is exposed to view ready to receive any thing that passes over it.

This is by no means the first time that attention has been called to the peculiar behavior of mercury when acting as an electrolytic surface. In the early part of the century, Gerboni, Herschel, and Davy noticed it. In 1875, Sir Charles Wheatstone patented a telegraphic instrument in which the indications resulted from the motions of a column of mercury under varying currents; and a little later, Mr. Robert Sabine made a thorough investigation of the subject. He found that when water is placed upon the surface of mercury, the latter immediately becomes converted into suboxide, if it be not already so. If the water and mercury be then connected with the battery in the manner described above, the suboxide is reduced and the surface becomes metallic. With powerful currents, this action, owing to the difference in bulk of the metal and the oxide, is accompanied with rapid circulation of the metal. If a globule of mercury be placed in a narrow groove filled with water so as to divide it into two parts, and a current be passed lengthwise through the groove, one end of the globule will be continually converted to suboxide and the other deoxidized. Now as the atomic value of the mercury is 14·7 and that of the suboxide may be taken at 38·9, there is a great expansion at one end of the globule, causing a mechanical circulation of its molecules from the larger to the smaller end, and a rolling action which carries the mercury bodily forward in the direction of the current.

Applying these facts to the explanation of the action of Mr. Barker's electro-amalgamator, it will be seen that there is a constant electrolytic action going on at the surface of the mercury, and that, when this is exposed to water only, the process is simply a deoxidizing one. When, however, sickening ores are passing over the mercury, the action of the current will be to break up any combination that may take place between the mercury and such of their elements as are included in the list of substances which, under the influence of electrolysis, are carried to the anode. These are the metalloids, such as oxygen, sulphur, chlorine, boron, carbon, and perhaps arsenic. It is not distinctly known what is the exact cause of the sickening of mercury, but there is good reason to believe that sulphur and arsenic are the most potent agents in the matter. Hence, while their chemical affinity would cause them to combine with the mercury, their electro-negative condition prevents their union with its electrolytic surface, when a current is passing through them. On the other hand, the combination with the mercury of all the negative metals, gold, silver, copper, tin, lead, nickel, zinc, etc., would be favored by the current.

It will thus be seen that the action of the electric current in an amalgamating riffle tends to prevent the combination and adhesion of any electro-positive elements to the mercury, and to leave the quartz, with the sickening ores, floating mechanically on its surface, ready to be carried off by the current of water. This effect is exhibited by the Electro-Amalgamation Company, Limited, No. 37 Lower Chambers, Moorgate, London, on a considerable scale. The company has fitted up several amalgamating apparatus, consisting of inclined tables about six feet wide, with riffles or baths of mercury placed at intervals. The bottom of each riffle is of copper, and is connected with one pole of an Elmore dynamo machine; while over the top, separated from the mercury by a space of about half an inch, is another plate of copper, connected with the other pole of the generator. A stream of water carries the pulverized ore down the table and between the mercury and the upper plate, the dirt being carried forward by the current, and the gold retained by the bright, clean surface of the mercury. In some cases, stirrers and rakes of various kinds are adopted in place of the upper pole plate, according to the nature of the rock treated.

But the attainment of a clean mercurial surface is not all that stands between the gold miner and success in amalgamation. Much gold is "rusty," that is, it is coated with a skin or pellicle of sulphuret, probably from contact with sulphureted hydrogen. A piece of such gold may be immersed in perfectly pure mercury without any amalgamating

action whatever, and consequently the mercurial process has hitherto been useless for its recovery, and rusty ores have been smelted. This raises the cost of milling in Colorado from $1.50 to $15 per ton of dirt—a notable difference. The company claims that the new process is effectual for causing the amalgamation of rusty ores, but it does not offer any satisfactory explanation of the action by which it operates beyond stating that "by electric action the gold and silver are driven to the negative pole, and . . . . it is obvious that the natural gravitation of the gold and silver is so assisted by the attraction of the electric force as to allow but few if any of the particles to escape." This can scarcely be called a scientific explanation, but we understand that a considerable consignment of rusty ore is on its way, and then the result may be determined by actual experiment. If successful in this respect, Mr. Barker's invention promises to be extremely valuable, while, under any circumstances, its power of maintaining the surfaces of the riffles free from contamination, if found to be as effectual in actual practice as in experiment, must open to it a wide field of usefulness.

DESTRUCTION OF THE LOISEAU FUEL-WORKS.

Care might have prevented the destruction of the Loiseau Patent Fuel-Works at Linden and Bath streets, Port Richmond, which were almost entirely swept away by the flames shortly after two o'clock on the afternoon of the 8th. The works comprised three adjoining structures arranged in the shape of an L, and were devoted to the manufacture of fuel from coal-dust and tar. The fire was caused by gas generating in the large iron vessels in which the tar is heated preparatory to mixing the coal-dust. It appears that one of the employés was negligent in not taking precautions to let the gas find an exit; and when he endeavored to open a valve attached to the apparatus, it is supposed that the accumulation of gas was ignited by a fire under the boiler, and a slight explosion followed. The flames burst out all around the machine, and in an instant the entire room was on fire. Owing to the highly inflammable character of the contents of the place, the fire spread with alarming rapidity. Great columns of black smoke rolled up from the burning tar so thickly at times that the entire works were obscured from view, and put the firemen to serious inconvenience. The fire soon communicated from the pitch-house to the finishing-house, a large frame building where the artificial coal is dried, which, together with the other buildings, was entirely destroyed. The third building, a brick structure adjoining the finishing-house, was considerably damaged. A large shed, a few yards from the pitch-house, also fell a prey to the devouring element. The works were erected about eight years ago, but operations were suspended until a year or so ago. The building in which the fire originated was thought to be fire-proof. The buildings were owned by the Philadelphia & Reading Railroad Company, which was also the owner of about $30,000 worth of the machinery in the establishment. Recent improvements were made by the Fuel Company, which put in machinery valued at about $12,000.

RECENT EXPERIMENTS IN LEAD SMELTING IN THE HARTZ MOUNTAINS.

At one of the smelting-works of the mining district of the Upper Hartz Mountains, at Altenau, lead ores are smelted which, in their composition, differ from most of the ores of the district in being lower in lead and higher in quartz and blende. These could be readily worked by the ordinary Hartz smelting process in cupolas, with fluxes containing iron, while the supply of copper slags from Oker, containing a high percentage of iron, were still available. When, however, that supply had been exhausted, and "blue billy" obtained in the wet extraction of copper from low-grade pyrites had to be substituted for the slags, the fact that the "blue billy" was a powder and contained from 15 to 20 per cent of water increased the difficulties in working and ran up the cost. In 1877, the order was therefore given to begin a series of experiments with the roasting and reducing process, as a substitute for the "precipitation" process. The results of these experiments have now been published by Herr Cramer von Clausbruch, of Altenau, in the *Zeitschrift des Berg-, Hütten- und Salinen-Wesens*. The ores worked contain from 54 to 55 per cent of lead, 0·08 per cent of silver, 0·9 per cent of copper, from 7 to 8 per cent of zinc, and from 14 to 18 per cent of silica. They are roasted in a single-hearth reverberatory furnace, 19 meters (62·3 feet) long and 3 meters wide (9·8 feet) in the clear, and provided with a series of condensation-chambers. It has 14 working-doors on both sides, and two fire-doors. Near the fire-bridge, the hearth is shaped into a shallow sump, to be used for containing the roasted charge when melted down. The ore is charged at the point farthest from the fire-bridge, and is gradually conveyed toward it. The bulk of the sulphur oxidized escapes as sulphurous acid, a small proportion forming sulphuric acid, which combines with oxide of lead to form a sulphate which, at a greater heat, is converted into a fusible silicate. The best results in roasting were obtained with ore running from 55 to 60 per cent of lead, and 15 per cent of silica. The ore must be as fine as possible, not exceeding 2 millimeters (0·08 inch). With a smaller amount of silica, a part of the sulphate of lead is not decomposed, and leads to the formation, in the final heat, of a matte, which is not unfavorable when there is copper in the ore.

The furnace at Altenau takes four charges of 30 cwts. per day of twenty-four hours, the consumption of coal being 22 cwts., or 18·3 per cent. The yield from 100 parts of ore is 85 parts of well-slagged material, ten parts of a mixture of slagged and so-called "raw" material, from 2 to 3 per cent of "raw" stuff, and from 2 to 3 per cent loss of weight in roasting, etc. The slag is almost entirely free from sulphur, contains only traces of the copper in the ore, and runs about one half of the percentage of silver in the ore, almost all the copper and the bulk of the silver apparently going with the sulphur.

The roasted and slagged ore is smelted in blast-furnaces, having two tuyeres and a water-jacketed back wall, and, in view of the basic character of the charge, not provided with a siphon-tap or a closed front. The object of the smelting is to reduce the lead in the silicate and to reduce so much iron from the charge as is necessary to decompose the sulphide of lead. At present, 80 cwts. of roasted ore are mixed with 20 cwts. of raw ore, preferably those grades running higher in pyrites, and to this charge of 100 cwts. are added, according to the percentage of silver and zinc, from 20 to 25 cwts. of puddling cinder, from 20 to 25 cwts. of Oker blue billy, practically iron ore, from 15 to 30 cwts. of lime, and from 32 to 34 cwts. of coke. From 176 to 187 cwts. of charge are put through in twenty-four hours, the pressure of the blast ranging from 14 to 20 millimeters of quicksilver. The furnace is run by three shifts of men, including one furnace-man, one slag-man, and two chargers.

In examining the charge, the addition of raw ore will appear strange; but it is considered necessary to make a matte for the sake of the copper left in the blue billy and the percentage of that metal in the ore. It might be suggested that the roasting process be so conducted that the quantity of sulphur necessary to make matte be left in the ore at once. This, however, would make it necessary to roast the raw ore now charged directly, and besides would not make it possible to conduct the roasting process in the proper way. It was thought that lime could be largely used as a basic flux, as it is cheap and would make light slags. It was found, however, that the quantity is limited by the presence of zinc.

In the assay of the slag, fine silver is added; and by this means, the returns are one quarter of one per cent higher than with ordinary assays. The percentage of lead thus found in the slags ranges from 0·5 to 0·75 per cent, all lots containing more being returned to the furnace. An analysis made of the slag produced in the first quarter of 1882 gave the following result:

	Per cen
Silica	30·32
Sulphate of baryta	0·19
Lead	0·13
Copper	0·18
Silver	0·0007
Antimony	0·09
Protoxide of iron	35·72
Alumina	3·20
Oxide of zinc	7·27
Oxide of manganese	1·66
Nickel and cobalt	Trace
Lime	16·15
Potassa	0·67
Soda	0·61
Sulphur	1·47
Phosphoric acid	2·04

Contrary to opinions expressed, the cost of the process is not much less than the old precipitation process. It is more costly so far as labor and fluxes are concerned, but lower in fuel, the net gain for Altenau being 6·51 marks per 100 cwts. of ore.

The percentage of lead contained in the ore, as found by fire-assay, is fully recovered on a large scale, 98·5 per cent being obtained at once in the base bullion. The yield of silver is larger than the returns by fire-assay.

THE MECHANICAL ENGINEERING OF COLLIERIES.*

Compared with the elaborate and accurate text-books which English literature possesses on metallurgy and on many branches of civil and mechanical engineering, the great field of the mining engineer here has been sadly neglected by writers. British students and engineers are very much better off than those interested in the subject of mining in this country. We do not possess a single manual, a single text-book or work of reference representative of American practice, and those who want to "read up" must hunt over large libraries, through the files of technical journals, the transactions of engineering societies, and the reports of State surveys to cull the few fragments of experience put on record. There is much that is characteristic in American practice, developed by the special exigencies of the cases met with here; and without careful study and quite extensive travel, it is unfortunately impossible to get a fair insight into our methods. We know of many interested in coal mining in widely separated sections of our country who have spent weeks in watching the works in the anthracite collieries of Pennsylvania, and we have no doubt that to them the widely different methods in use in English collieries will prove a subject full of valuable suggestions.

A very large proportion of the coal mined in this country is brought to the surface through tunnels driven on the vein, and, with the exception of a few slopes and one deep shaft in the anthracite regions, nothing but comparatively shallow pits, rarely exceeding 300 feet, are used. In almost every particular, the mechanical appliances we require are not of such gigantic dimensions, nor are they called upon for such a high duty, as the equipment in scores of collieries in England and Scotland. Yet the work before us is, we believe, one that is entitled to, and will undoubtedly receive, a place of honor in the library of every one who is engaged in coal mining. It is the first of two volumes, a considerably enlarged republication of a series of articles published by Mr. C. M. Percy, of Wigan, in the *Colliery Guardian*. Mr. Percy needs little introduction to those who have closely followed the literature of coal mining for years. He has been for a long period engaged in every-day practical work in the management of English collieries, is apparently a keen, progressive observer, and has the rare gift of presenting what he has seen and experienced in clear, plain language. Mr. Percy has not cared to startle his readers with numerous quotations from a wide range of literature. He writes what he has gleaned in an active business life, and warns his students against many an error the disastrous results of which he has had occasion to observe. He does not embarrass by an undue attention to details, and yet we have noticed in the pages of hi book many of the little "points," one alone of which we have often considered an ample reward for a day's persistent "pumping."

In the first volume, now before us, Mr. Percy deals with the laying out of surface plant, a work which, of course, is directly applicable to only a few American mines, the conditions being so widely different. Still, the chapter contains many suggestions of value. The second, third, and fourth chapters on winding or hoisting engines, with a series of notes on their various parts, fully illustrated with a number of plain outline cuts, will be fully appreciated. The fifth chapter gives an example of a horizontal hoisting-engine which probably would meet with more favor in this country than the single vertical engine at Monkwearmouth, described in the next chapter, which nevertheless, according to Mr. Percy, is doing excellent work. The Burns brake next engages Mr. Percy's attention, the principal points of this appliance to which

* *The Mechanical Engineering of Collieries*. By C. M. Percy, Wigan. Volume I. Published by the *Colliery Guardian*, London.

Mr. Percy appears to attach much value being that a comparatively small brake-shoe is used. It is simply a block of pitch-pine, into which a number of holes have been drilled, filled with sand.

The important subject of ropes and drums, their cost, their safety, etc., is discussed at length in the eighth chapter; while the kindred subject of conductors and cages is taken up in the next. Mr. Percy gives some good points on head-gears and their construction; on detaching-hooks, screens, and tipple arrangements; and then goes, with considerable detail, into a description and discussion of underground and surface boilers.

In speaking of mechanical ventilation, Mr. Percy is rather non-committal, so far as the merits of various types of machines are concerned; but he does not hesitate to express his convictions on the question furnace *versus* fan, strongly advocating the latter.

Mr. Percy's work is now the best we have on the mechanical engineering of collieries, and, in the absence of any strictly American work, to a certain extent fills a want severely felt. It does not pretend to give working drawings of plants erected in England, and those seeking models will be disappointed. We heartily recommend the book to our readers.

THE AMMONIA INDUSTRY AND THE SCOTCH IRON MANUFACTURE.

Mr. Robert R. Tatlock, chemist, of Glasgow, gives some interesting details in regard to the manufacture, in Scotland, of ammonia from blast-furnace gas. It must be remembered by American readers that, unlike the greater number of our blast-furnaces, those of Scotland use raw coal. It had long been known that ammonia existed to an appreciable extent in the waste gases of blast-furnaces, as it does in the gaseous products of combustion from all coals; but the mechanical difficulties in the way of recovering it were so great that it was not attempted until quite recently, when Messrs. William Baird & Co., of Gartsherrie, Scotland, erected large and costly apparatus for condensing it in the form of ammonia liquor, as well as the tar which distills off from the coal in the upper part of the blast-furnace. When it is considered that an average furnace will consume 50 tons of coal per day, and each ton of coal burned gives 130,000 cubic feet of waste gases; that these have an initial temperature, after leaving the furnace, of about 500 degrees Fahr.; and that this enormous amount of hot gas, weighing about four tons, contains only about six pounds of ammonia, the difficulties with which the pioneers of this new industry had to contend can be realized. The result is, that at present about one ton of sulphate of ammonia per day is made at the Gartsherrie Iron-Works, with less than the waste gases from two furnaces; and it is said that the whole of the other furnaces belonging to the firm are, as quickly as possible, to be adapted to the production of ammonia. But while the erection of the enormous plant was going on, certain of the other Scotch iron-masters were not idle, and sought means of recovering the ammonia in other ways. More than one of them has experimented largely, and it is believed successfully, with the object of obviating the necessity of cooling such a large volume of gas, their method consisting in scrubbing the hot gases with a shower of sulphuric acid, producing sulphate of ammonia at once, which, however, is of a dark color unless much care is bestowed upon it in order to keep it clean. The latest, however, with regard to the recovering of ammonia from furnace gases is, that a celebrated firm of iron-masters in the neighborhood of Glasgow has secured full patent rights for fixing the ammonia by means of a sulphurous or other acid in the form of vapor or gas, which, meeting with the gaseous ammonia, forms at once a salt easy of condensation, and easily scrubbed with water, yielding a solution of some 60° Twaddle, instead of about 4° Twaddle, as in the condensation method. The product consists of a mixture of hypo-sulphite, sulphite, and sulphate of ammonia; but it must be borne in mind that for some purposes it is not necessary that the ammonia should be in the form of sulphate at all. For the Brünner and Mond ammonia-soda process, for instance, the less sulphate there is the better, as, when distilled with lime, in order to obtain the free ammonia, the residue in the stills will consist of a solution of the soluble hypo-sulphite and sulphite of calcium, instead of nearly insoluble sulphate. At present, the annual consumption of sulphate of ammonia in England is nearly 3000 tons for the ammonia-soda process alone, and the quantity will certainly increase. One great advantage of this method is, that it requires no sulphuric acid, the sulphurous acid being obtained by burning, in a suitable kiln, by means of the cold blast, the waste sulphurous "blues," which can be had in Scotland by the hundred thousand tons for the lifting. In any case, if it is required to produce the ammonia in the form of sulphate, that can easily be done by distilling with lime and receiving the evolved ammonia in sulphuric acid, as usual.

It is not difficult to make an estimate of the prospective amount of ammonia from this source, at least so far as Scotland is concerned, where there are probably as many as 130 blast-furnaces capable of being adapted to the recovery of the ammonia without injury to the gases for heating purposes, such as firing boilers and heating the blast. Each furnace consumes, say, 50 tons of coal per day, and each ton of coal is capable of yielding ammonia equal to about 25 pounds of sulphate. This gives for each furnace 1250 pounds of sulphate in 24 hours, or 72½ tons per day for all Scotland, or, for a year of 350 working days, 25,375 tons, the value of which, at present rates, is nearly two and a half million dollars; and probably the blast-furnaces working on coal in England are capable of producing quite as much.

FORMING SECONDARY BATTERIES.

From the English patent specification of Mr. C. Brush, the well-known Cleveland inventor, *Engineering* extracts the following interesting account of the difficulties experienced in forming secondary batteries: The most common form of secondary battery consists of two sheets of lead placed near together, but not in contact, and immersed in dilute sulphuric acid. When an electric current is passed through such an apparatus, water is decomposed; hydrogen is occluded by, or combines with, one of the lead plates, while oxygen combines with the other and forms a coating on it of peroxide of lead. This oxide of lead, not being capable of combining with any acid, is not affected by the presence of the sulphuric acid employed. Now, if the exciting current be removed, it will be found that the apparatus has become a powerful battery, giving a current in a direction opposite to that of the exciting one. But this current is of short duration. If, however, the charging current be reversed from time to time, frequently during the first few days and more rarely afterward, the capacity of the apparatus will be greatly increased. This constitutes the customary process of "forming" the plates of a secondary battery.

The formation of peroxide of lead on one of the plates continues indefinitely as long as the exciting current is maintained, becoming constantly slower as the metallic surface acquires an increasing protection against further action by the constantly increasing thickness of the coating of peroxide of lead. This coating is a good conductor of electricity, and free oxygen is evolved at the surface of the coating. Now, if the exciting current be stopped, local action, somewhat similar to that in galvanic batteries, commences between the peroxide of lead and the backing of metallic lead with which it is in contact. By this action, the peroxide is gradually reduced to a lower state of oxidation, while more of the metallic lead of the plate is oxidized by the oxygen thus made available. The fresh lead thus oxidized doubtless acquires the same condition of oxidation as the original protoxide finally assumes. But the peroxide is never by this action reduced to a state of protoxide, as is proved by the color of the coating and by the non-action on it of the sulphuric acid. When peroxide of lead is thus reduced to a state of lower oxidation, it becomes useless for the development of a secondary current until freshly charged or reoxidized. Thus is explained, as far as the oxygen plate is concerned, the cause of the gradual loss of charge observed in lead secondary batteries. Further, since the conducting power of peroxide of lead rapidly decreases as its oxygen is removed, the reason of the high electrical resistance of the oxidized plates, after long standing uncharged, is also explained. When a plate that has lost its original charge by local action is recharged by an electric current as at first, it will hold a larger charge than before, because all the lower oxide will be raised to the condition of peroxide, and thus more of the latter will be present than at the previous time of charging. This explains why the oxygen plates of secondary batteries constantly increase in capacity, even though the exciting current be applied at long intervals.

At the opposite side of the battery, hydrogen appears as the result of the charging current. This is absorbed at the surface, being simply occluded, or more probably forming a definite but feeble chemical combination with the lead. If such a combination exists, it is probably a stable one as far as local action is concerned. At any rate, the capacity of the hydrogen plate never becomes at all considerable when it is subjected to this action alone. Hence in practice the oxygen plate soon acquires the greater capacity, and the charge must be reversed to cause the oxygen to act upon the hydrogen plate to bring it into a spongy condition, in which it can retain an amount of hydrogen equivalent to the oxygen stored in the opposite plate. Thus it is the oxygen plate for the time being that receives all the improvement from the charging action, the hydrogen plate remaining almost unaltered. This is the reason for the frequent reversals of the charge in forming batteries. When a previously excited secondary battery is discharged, the peroxide of lead is thereby reduced to a state of lower oxidation, as already explained. Thus what was at first a good conducting envelope on the metal plate is now reduced to a poor conductor, while at the same time pure water is formed within the mass of lead oxide, and presents a further barrier to the passage of the current. These two causes account, so far as the oxygen plate is concerned, for the increase of resistance in secondary batteries during their discharge, and especially toward the end of the process. Water is also formed in the pores of the hydrogen plate.

The difficulties of forming batteries by this process arise from the fact that the coating of peroxide of lead on one of the plates necessarily occupies more space than the metallic lead did. The covering must then expand in all directions in forming; and to accommodate this, the structure of the deposit must be more or less broken up, or else the lead plate must expand. When the direction of charge is reversed, the previously expanded mass shrinks. Both the expansion and contraction may be rendered manifest by treating one side only of a plate, the other side being protected by varnish. When such a plate is oxidized, the exposed side becomes convex; and when the oxide is subsequently reduced, the same side becomes concave. During the processes of charging and reduction, the expansion and shrinking do not occur in all parts of the mass at once, hence a disintegrating action is set up, and the coating eventually peels off. Again, every time the deposit of lead is reduced, a notable quantity of sulphate of lead is formed within the mass, and exercises a very deleterious influence, stopping the pores, and aiding the disintegration by its superior volume.

THE BÜTTGENBACH SYSTEM OF SEPARATING BLENDE AND PYRITES.—We have repeatedly referred to Franz Büttgenbach's method of separating zinc-blende from iron pyrites as practiced at Lintorf, Westphalia. The separation of intimately intermixed minerals from each other has been effected hitherto mainly by taking advantage of differences of density, structure, or capacity for being rendered magnetic by calcination. Herr Büttgenbach makes use of the properties of minerals evinced in differences of cohesive strength. The separation of minerals of unequal hardness, by reason of their greater or less susceptibility to break down into fragments of different sizes, is not possible with the ordinary crushing or stamping mill; but it is different when the mass is thrown violently against a hard, resisting surface, in which case, if the velocity is properly proportioned, only the more brittle substances are broken. In order to obtain a proper separation of iron pyrites and zinc-blende, Herr Büttgenbach has been led to experiment on the use of Vapart's centrifugal breaker, not only as a crusher but as a separating machine. The ore is passed through it and is then simply screened. At a speed of 800 revolutions per minute, in the Vapart crusher, lumps of iron pyrites of from 20 to 25 millimeters diameter will leave it either as dust or grains of from 1 to 1½ millimeters; whereas, with 400 revolutions, they will come out of it but little touched. With 800 revolutions, however, zinc-blende is crushed to the finest dust: while with from 300 to 400 revolutions, it leaves the apparatus partly as dust and partly in grains of ½, 1, 2, and 3 millimeters. If, now, a mixture of pyrites and blende is put into the apparatus and passed through it at a speed of 400 revolutions per minute, the pyrites leave it in almost the same state in which they entered it, while the blende is very finely reduced, and the separation of the two minerals may then be easily effected by a simple sifting process.

THE GRANT SMELTING-WORKS.

Written for the Engineering and Mining Journal by O. J. Frost, Argo, Colorado.

(WITH SUPPLEMENT.)

The Grant Smelting-Works are situated about two miles from the central business portion of Denver, in the northeastern part of the city. They are the most recently erected and the largest silver-lead smelting-works in the country, as well as the combined result of a full knowledge of the best processes the world over and of an experience ripened by several years in the smelting of Colorado ores at Leadville.

The history of the Grant works furnishes a typical example of the growth of Western industries. When the extensive resources of Leadville were proved, the foundation of the present smelting establishment was laid by the erection of a single blast-furnace. From time to time, others were added, until, last spring, when the works were completely destroyed by fire, it was the foremost smelter in Leadville. It was desirable to rebuild at a more central point. After a careful consideration of the railroad facilities for the transportation of ore, and the abundance and quality of fuels and fluxes obtainable at various centers, Denver was chosen as best answering the requirements. The new works are owned by Eddy, James & Grant; Messrs. Eddie and James having bought an interest owned in the old works by Judge Grant, an uncle to Mr. J. B. Grant, the present partner. Mr. J. B. Grant is a metallurgist of both high theoretical and practical attainments, having supplemented an American college education by three years of study at the Royal School of Mines, Freiberg, Germany, to which has since been added his smelting experience at Leadville. At present, he is Governor of Colorado, having been elected last fall to that position. Messrs. Eddy and James are business men of wide and successful experience. The metallurgist is Dr. Malvern W. Iles, a graduate of Columbia School of Mines, who has gained a thorough knowledge of Colorado ores in his position of chemist for the former company at Leadville. A young man, he is an enthusiastic devotee of science, and to its records he has already made a number of valuable contributions.

The site chosen for the works was a terrace next the bottom of the Platte River. On one side, it affords facilities for the delivery of ore, fluxes, and fuels by the cars on a level with the charging-floor of the works, while it also gives an unlimited slag-dump on the other side from twelve to fifteen feet below the furnace hearths.

The works consist of a large brick building (represented in plan and section by Figs. 1 and 2 on accompanying plate) and an addition at the southwest end, not shown. This building is 230 feet long and 100 feet deep. The end walls are 22 inches thick, strengthened by four abutments, each four feet wide, which project two feet at the base, but at the roof recede to the level of the wall. The front wall is 13 inches thick, and has twelve eight-foot openings for easy access to the ore-bedding floor. Between these openings or doors, strengthening abutments project outward two feet, and inward 11 inches. The rear of the building is supported at the corners by two brick piers eight feet square, and between by eleven square iron pillars. The roof is of iron supported by truss-work. The front side of the building is taken up by the ore-bedding floor, which is of planks resting on timbers imbedded in the solid earth, furnishing an unyielding support for any weight of ore. Along the rear of the works are the furnace-floor and the feeding-floor. Between these floors and the ore-bedding floor, leading to the stack, is the dust-chamber. It is 6 feet wide and 15 feet high internally, and is built with 18-inch walls. The roof is arched, and the side next the ore-bedding floor is provided with a projection (*a*, Fig. 2). Access to the chamber is had from the furnace-floor by means of doors, one of which is represented in Fig. 2. The stack is octagonal outside, each side being 8½ feet at the base, but slightly tapering upward. The interior is square, 12 feet on a side, and is provided with iron bar straps. Its hight is 155 feet. The furnaces, eight in number, stand in a row on the furnace-floor at distances varying from 23 to 27 feet from center to center. They are numbered 1, 2, 3, 4, 5, 6, 7, and 8, each having a special name given it by the workmen. An additional furnace, 9, is in process of construction. It was originally intended to erect another, but the space for the tenth has been taken up by a tramway (represented in Fig. 1) for raising slag used as a flux. The furnaces are a rectangular modification of the Pilz Freiberg furnace, all being of the same construction. The automatic siphon-tap used is a distinguishing feature from the Pilz; another distinction is the use of ten instead of eight tuyeres. Like the Pilz, the slag is tapped through a tap-hole in the closed breast. The lower portion of the furnaces is provided with water-jackets, and the fumes are conducted by a flue leading from the upper portion of each furnace to a dust-chamber and thence to a common stack. On the furnace-floor next the dust-chamber is a tramway for removing the bullion to cars on the broad-gauge track (railroad, Fig. 1) by which it terminates. In front are two narrow-gauge tracks (*r r*, Fig. 1), from which the ore is bedded. Several other tracks, not represented in the plan, lie farther in front. A switch-engine owned by the company is in use for convenience in handling the cars. At the ends of the building are dumps of charcoal, coke, and limestone, four furnaces being furnished with these materials from each end. The addition mentioned above at the southwest end contains the engine, blowers, and electric light machine. The assay-office and the general office are each in a separate building to the front of the works proper.

The details of the construction of a furnace are as follows: The hight from the furnace-floor to the upper surface of the charging-floor is 18 feet 2 inches. The hearth or crucible, 30 inches in hight, is built of fire-brick, without tamping, and is inclosed in cast-iron plates 1¼ inches thick. The brick-work is underlain by a plate of boiler-iron, to prevent any molten lead which penetrates the brick getting beyond the limits of the hearth. The hearth is 10 feet long and 6 feet 3¾ inches wide externally. The hearth cavity (*b*, Figs. 5, 6, and 7) is 80½ inches long and 36 inches wide at the top, but one foot smaller each way at the bottom. Its depth is 22 inches. The automatic tap consists of a retangular passage left in the brick-work of the hearth, leading from one side of the hearth cavity to a small lead well (*c*, Figs. 5 and 7) in the upper portion of a column of fire-clay, inclosed in sheet-iron, which is bolted to the cast-iron hearth-plates. The water jackets (*e, e, e*, etc.) are 3 feet 5 inches high, 6 inches thick, and are cast in fifteen pieces—five on each side, two on the back, and three on the front end. They are hollow shells of cast-iron five eighths (⅝) of an inch thick. They rise on a line with the hearth cavity, 18 inches to the boshes, then slant outward 6 inches in the remaining 23. On the outside of each jacket, 17½ inches from the bottom, begins a projection (*f, f*, etc.) 8 inches wide. It runs 3 inches above the top of the jacket and extends at the upper portion 4 inches. It gives on the interior a channel (*f'*, Fig. 7) for the entrance and exit of water. Water is supplied cold to the interior (*e'*, Fig. 7) of the jackets by means of the small pipes (*h, h*, etc., Figs. 3, 4, and 7), one to each casting of the jacket. These pipes branch from a supply-pipe (*g*, Figs. 3, 4, and 7) running around the furnace, which in turn is itself a branch of the main delivery-pipe (*x*, Fig. 4). The heated water runs out at the openings *i, i*, etc., into galvanized iron troughs (*j, j*, etc). From these troughs the water is conducted by a cast-iron water-pipe (*k*, Fig. 4) to a common pipe for waste water beneath the furnace-floor. Although the entrance orifice is near the exit, no special device is needed to keep the water mixed, simple connection being sufficient to maintain a uniform temperature. At the front end of the furnace, the water-jackets are so cast as to leave room at the middle for a breast (*l*, Figs. 3 and 6) of fire-brick, 5½ inches high and 16 inches long. The tap-hole (*m*) for slag is in the lower portion of this breast. Above it is a small jacket (*n*), 9 by 16 inches, for the front tuyere. The tuyeres (*o*) enter the furnace 8 inches above the hearth. They are of brass, fitting the openings in the jackets closely, 4 inches in diameter at the outer end and 3 inches at the inner. Their axes are horizontal. The blast-pipes are of galvanized iron above and below (*p, p*, etc.) with strong, closely woven canvas bags, soaked in silicate of soda, connecting them with the tuyeres (*q*). They branch from the blast-main (*r*) for each furnace. This itself branches from the common blast-main (*s*, Fig. 2). At the tuyeres, the internal dimensions of a furnace are 80½ by 36 inches. A furnace of larger size was built in Leadville at the old works; but it was found not to work well, on account of a wedge of ore in the center of the furnace which the blast did not reach. The shaft of the furnace is 12 feet 3 inches above the water-jackets. It is common brick, lined with fire-brick. The brick-work is supported by a cast-iron collar or supporting-plate (*t, t*) extending around the furnace, and resting on the tops of four iron pillars, one at each corner. Arches in the common brick from corner to corner give strength to the shaft. The shaft is bound by five tie-rods on each side and end, secured in vertical castings at the corners. A round sheet-iron flue (*v*, Figs. 2, 4, and 6), 30 inches in diameter, conducts the fumes downward into the dust-chamber, as shown in Fig. 2. The charge is introduced through a rectangular sheet-iron curtain (*w*, Figs. 3 and 4), 34 by 70½ inches. It leaves a space covered over tightly with sheet-iron, 12 inches wide on the sides, and 16 inches on the ends, not filled by ore, into which the fumes rise before passing down the flue. At the front end of the furnace for conducting away the fumes rising from the slag at the time of tapping, is a sheet-iron hood (Figs. 2, 3, and 4). Its stack slants forward in the lower portion to the shed, through the roof of which it rises vertically.

The power for the works is supplied by an eighty-five foot horse-power Corliss engine, made by Fraser & Chalmers, of Chicago. It drives the blowers, runs the pumps, works the electric light machine, and raises slag to be mixed with the charge for flux.

The blowers are Baker's rotary pressure, No. 7½. The works are provided with three, two being in constant use, and the third in reserve. They supply the blast to the furnaces by the blast-main (*s*, Fig. 2), 3 feet in diameter, made of galvanized iron, running the length of the furnace-room next the dust-chamber. At present, cold blast is used; but it is proposed to heat it by changing the position of the main to the inside of the dust-chamber. The blast-pressure is denoted by Wilbraham mercury-gauges, one to each furnace.

There are two pumps to supply water to the jackets, engine, and other needs of the works. One pump only works at a time; the other is in reserve in case of breakage of the first. The water is pumped into a large tank outside the works above the level of the water-jackets. From this tank, it is supplied to the furnaces by means of the 6-inch iron water-pipe (*x*, Fig. 4) running the length of the works in front of the furnaces.

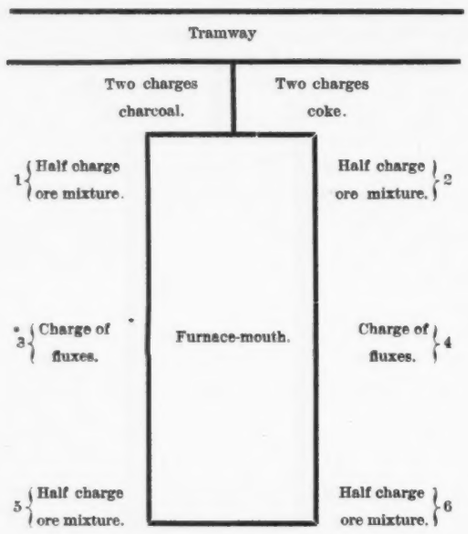
Light is furnished by Weston's electric light machine. There are ten lights distributed to perfectly light the dumps outside as well as the inside of the works. All the rest of the iron-work and machinery was furnished by the Colorado Iron-Works, of Denver, Colo.

At least seven tenths of the ore smelted is carbonate ore from Leadville. The rest comes from various other parts of Colorado, as well as from New Mexico, Arizona, and Idaho. Previous to smelting, the ore is mixed on the ore-bedding floor (Figs. 1 and 2). It is wheeled on to the bed with barrows run on planks which are shifted as the bed rises. The ore is spread in layers covering the whole bed, each layer being of uniform thickness throughout, but different layers varying in thickness with the mineral character of the ore as determined by chemical analysis, and its richness as determined by fire-assay. A bed, when finished, is five or six feet high, and contains from six hundred and fifty to eleven hundred and fifty tons. In richness, the beds range from 17 to 40 ounces in silver, and from 16 to 22 per cent in lead. The charge consists of ore, 500 pounds; limestone, from 75 to 100 pounds; slag, from 60 to 70 pounds; coke, from 60 to 80 pounds; charcoal, from 30 to 50 pounds. The ore is shoveled from the bottom of the ore-bed, the upper layers falling to the floor and mixing well, into iron barrows or "ore-buggies," weighing 75 pounds each. The barrows, when loaded with about half a charge, are run on to the ore-scales, an exact half-charge is weighed by adding or throwing off ore, and the ore is then wheeled to the mouth of the furnace and dumped on the charging-floor. There are two pairs of ore-scales, one of the Howe and one of the Fairbanks make. Each scale has several beams which may be set and locked out of sight of the workmen, and the ore weighed on any one of them as set, without the trouble of changing weights—insuring both secrecy and accuracy.

The limestone used as flux is from near Morrison, Colo., and is of a very pure variety, as shown by the following analysis: $CaCO_3$, 94–96 per cent; SiO_2, 1½–2¼ per cent; $Al_2O_3+Fe_2O_3$, 2½ per cent; $MgCO_3$, trace; organic matter, trace. The use of magnesian limestone is particularly avoided. The limestone, first crushed into moderately small pieces, is brought in iron "flux-buggies," weighing 65 pounds each, to the flux-scales, where the charge is weighed, and then the charge of slag is added from a pile that has been elevated from the slag-dump by the tramway, Fig. 2. The fluxes (a full charge) are then

dumped on the half-charge of ore at the mouth of the furnace, after which another half-charge of ore is dumped on the fluxes. The fuels, coke and charcoal, are brought on a tramway (*y*, Fig. 2) from the dumps outside the works, and weighed on appropriate fuel-scales before dumping at the furnace-mouth. The coke used is from the coke-ovens of El Moro, Colo. The charcoal comes from Selida, Colo.

The following diagram will clearly represent the method of charging:



(The figures denote the order in which the materials are brought.) In charging, the "feeder" first spreads half the pile of charcoal (or one charge) on the top of the furnace; next, half the pile of coke; and lastly, he adds the ore and fluxes dumped on one side of the furnace-mouth. He then repeats the process, keeping the mixture of ore, fluxes, and fuels a little above the bottom of the curtain (*w*, Figs. 6 and 7). In regular working, no smoke or fumes come out of the mouth of the furnace, the draught being strong enough to convey them all down the flue to the dust-chamber; but for extraordinary cases, such as repairs to the dust-chamber or the common stack, each furnace is provided with a counterpoised stack of sheet-iron (Fig. 2). When needed, it can be instantly lowered to the furnace. On each side, it has an opening (*z*) for feeding. A damper in the flue of each furnace serves, when desired, to turn the draught from the dust-chamber up each furnace-stack. The damper can also be regulated so as to turn off one half or one quarter of the draught. The amount of blast used is regulated by a slide in the branch blast main to each furnace. The pressure varies from seven to ten ounces per square inch. The supply of water to the jackets is regulated by a screw cut-off in the pipes *h*, *h*, etc. The surface of the lead in the well is kept just below the top. It stands higher in the well than in the hearth or crucible, by the amount of blast used. The molten lead is dipped by the "furnace-man" and cast into bars of bullion weighing from 107 to 108 pounds. Two chips —one from the bottom and one from the top—are taken from each bar of bullion, for assay. The bullion runs from 100 to 200 ounces of silver and from 0·25 to 4 ounces in gold. It is shipped in car-load lots of 220 bars each to the Omaha Refining Company, where the precious metals are extracted from the lead by Balbach's modification of Parkes's process.

The slag is tapped in the ordinary way by the "slag-tapper" breaking the clay plug to the tap-hole with an iron bar. It runs into an iron slag-buggy standing under the spout; and when the outer portions solidify, it is drawn out by the slag-tapper and tipped over the dump. The nature of the slag is regulated by the price of fluxes and the requirements of the silver and lead markets; but none of it ordinarily needs re-smelting, except what is added to the charge as flux. From 55 to 65 pots or buggies of slag, weighing 270 pounds each, are tapped from each furnace per shift of twelve hours. A series of experiments on the specific gravities of the slags was conducted for a number of years at the old works in Leadville, without arriving at important metallurgical data. These experiments have now been discontinued.

Daily and nightly furnace reports are made, giving the following data:

GENERAL REPORT—GRANT SMELTING COMPANY.

No. of furnace.	No. of ore mixture.	When charge changed	No. of Pounds per Charge.						No. of charges at	No. of Lbs. per Furnace.		Pigs added.	Per Furnace, No. of		Remarks.
			Ore mixture.	Limestone.	Iron flux.	Slag.	Coke.	Coal.	charge.	Coke.	Coal.		Charges.	Pigs.	
1 to 10															
Grand Totals...															

Coal.. Engine..... Stoves.....

Denver..... 1883..... Shift.

Signed.....

The dust deposited in the dust-chamber is mixed with 8 per cent of caustic lime and re-smelted, either first mixing on the ore-beds or adding directly a shovelful to each charge. (Rich grades of ore are also mixed with 8 per cent of caustic lime before spreading on the ore-beds.) The dust from all portions of the chamber contains bromo-chloride of lead—a compound first discovered by Dr. Iles when chemist at the old works in Leadville. The metallurgical importance of the addition of caustic lime in re-smelting depends upon a double decomposition between the caustic lime and the bromo-chloride of lead. The probable furnace reaction is as follows: $PbBrCl + Ca(OH)_2 = Pb(OH)_2 + CaBrCl$.

The projection *a* in the dust-chamber gives the fumes a whirling motion and largely confines the draught to the upper portion, so that, together with a careful regulation of the dust-chamber doors, a stratum of pure air is left below in which combustion of carbonaceous matter takes place, concentrating the flue-dust and making it less disagreeable to handle. The flue-dust is removed from the chamber in barrows, the assay sample being obtained with a Spitz divider from every tenth barrow. A sample from eighty-one (81) tons—the dust deposit of the first four months' run—carried 32 ounces of silver to the ton, a trace of gold, and 26 per cent of lead. The roofs and windows of all adjoining houses have been examined for flue-dust and none has yet been detected. Some, however, has been found on the sheet-iron roofing of the smelter itself. It contained but one ounce of silver to the ton, and singularly, but a trace of lead.

Speise and matte are occasional products, and are saved in one large pile. A sample of 1800 pounds taken from all portions of the pile run 30·75 ounces of silver to the ton, a minute trace of gold, and 9 per cent of lead. None of it has yet been treated. It will probably be roasted in a reverberatory furnace before re-smelting.

The men work in twelve-hour shifts. Every two weeks, at noon, the shifts change from night to day. This bi-weekly change of shifts at midday gives opportunity to shut down the engine and make any needed repairs in the shortest possible time, as all the force is at hand to help at the time when the light is best. The number of men employed about the works is 130, as follows:

8 furnace-men to each shift	16	Cart-men	3
8 slag-tappers " "	16	Cart-helpers	2
8 feeders " "	16	Roustabouts	3
8 ore-wheelers " "	16	Flue-dust men	2
4 flux-wheelers " "	8	Speise man	1
2 fuel-wheelers " "	4	Blacksmith	1
Total about 8 furnaces	76	Carpenter	1
1 weighing-master to each shift	2	Bullion-loaders	3
1 engineer " "	2	Foremen	2
1 fireman " "	2	Bookkeepers	2
Ore-bedders (day)	15	Assayer, chemist, and metallurgist (each)	3
Ore-bedders (night), or relay night men.	5		
Timekeeper	1		130
Unloaders of fuel	4		

Construction of the works began in July, 1882. They were completed so that the furnaces were blown in as follows:

No. 1	October 7th, 1882.	No. 5	October 12th, 1882
" 2	" 10th, "	" 6	" 15th, "
" 3	" 11th, "	" 7	" 28th, "
" 4	" 10th, "	" 8	November 1st, "

The eight furnaces smelt from 211 to 250 tons of ore a day, 230 being about the average. This makes the actual working capacity up to date, of a single furnace, a little less than 30 tons. The production up to January 1st, 1883, here follows:

State or Ter.	Gold.	Silver.	Lead.	Totals.
Colorado	$27,900	$617,200	$533,000	$1,178,100
Arizona		123,000	3,000	126,000
New Mexico	20	10,000	600	10,620
Idaho		500	200	700
Other sources	1,500	16,000	4,300	21,800
Totals	$29,420	$766,700	$541,100	$1,337,220

The writer is under obligations to Dr. Iles, superintendent of the works, who was very kind in imparting information and considerate in offering facilities needful in collecting the material for the foregoing paper. He is also indebted to Mr. Nasmyth, of the Colorado Iron-Works, where the water-jackets were cast and all other iron-work for the smelter, roofs, etc., included, was manufactured, for information regarding the construction of the water-jackets.

IT is announced that a syndicate of capitalists in this country has purchased the patent for the Bull direct process of iron manufacture in this country on a favorable report made by Herr A. Hansen, of Dortmund Germany.

COAL RAISED IN THE UNITED KINGDOM IN 1882.—It appears that the quantities of coal brought to bank in the United Kingdom last year reached no less a quantity than 156,500,000 tons, thus exceeding the extraordinary production of 1881 (154,184,000 tons) by upward of 2,300,000 tons. As compared with 1880, the excess is as much as 9,700,000 tons, and as compared with 1879, it is 12,500,000 tons. This shows a progressive expansion in the production of coal that is really startling. The miners employed in the production of this mass of fuel numbered 501,000, so that each man, on the average, won 312 tons in the course of the year.

LIGHT GOLD COIN.—At a meeting of the British Institute of Bankers, a paper on light gold coin was read by Mr. R. H. Inglis Palgrave. Recent inquiries into the condition of the gold coinage of Great Britain showed that about eighteen years' wear would render a sovereign illegally light, and that 55 per cent of the gold coins now circulating were below the legal currency. The amount of English gold coin in circulation Mr. Palgrave estimated at about £100,000,000, the estimated cost of recoining which would be £786,000. Withdrawal of light coin must, he argued, proceed side by side with the issue of the full-weight coin, and the cost must necessarily fall either on the government or on the last holder of the coin. If the charge were to fall upon the last holder, injustice would be done, because the circulation of light gold was unequally divided over the

whole of the country; and Mr. Palgrave considered that the most desirable method of withdrawing the light coin would be by the government, acting through the Bank of England, exchanging light coins for new ones of full weight under certain conditions, including an allowance for maximum wear on each parcel, which would increase according to the age of the coin. A short discussion followed, in which the balance of opinion coincided with the views expressed in the paper.

WEIGHT OF ANTHRACITE COAL.—Mr. Heber S. Thompson, Engineer of the Girard estate, has been at some pains to ascertain the weights of anthracite coal in place. Samples were secured from the Mammoth, Seven-Foot, and Buck Mountain seams at the Kehley's Run colliery, and having been formed into perfect cubes, they were weighed on accurately adjusted scales. The weight of a cube containing 100 cubic inches having been ascertained, the weight of a cubic yard was simply a matter of calculation. The following results were obtained:

Mammoth Seam: 102 pounds per cubic foot and 2754 pounds or $1\frac{33}{800}$ tons of 2240 pounds per cubic yard.

Seven-Foot Seam: $99\frac{55}{100}$ pounds per cubic foot and $2688\frac{30}{100}$ pounds or $1\frac{30}{100}$ tons of 2240 pounds per cubic yard.

Buck Mountain Seam: $103\frac{55}{100}$ pounds per cubic foot and $2799\frac{55}{100}$ pounds or $1\frac{55}{100}$ tons of 2240 pounds per cubic yard.

Mr. Thomas proposes to find the weight of the coal in place in all the collieries on the Girard estate.

A REMEDY FOR BURNS AND SCALDS.—It is now many years ago, says Mr. F. Peppercorne, in the *Popular Science Monthly*, while engaged in some investigations as to the qualities and effects of the alkalies in inflammations of the skin, etc., that he was fortunate enough to discover that a saline lotion, or a saturated solution of bicarbonate of soda in either plain water or camphorated water, if applied speedily, or as soon as possible, to a burned or scalded part, was most effectual in immediately relieving the acute burning pain; and when the burn was only superficial or not severe, removing all pain in the course of a very short time; having also the very great advantage of cleanliness, and, if applied at once, of preventing the usual consequences—a painful blistering of the skin, separation of the epidermis, and, perhaps, more or less of suppuration. For this purpose, all that is necessary is to cut a piece of lint, or old soft rag, or even thick blotting-paper, of a size sufficient to cover the burned or scalded parts, and to keep it constantly well wet with the sodaic lotion so as to prevent its drying. By this means, it usually happens that all pain ceases in from a quarter to half an hour, or even in much less time. When the main part of a limb, such as the hand and forearm or the foot and leg, has been burned, it is best, when practicable, to plunge the part at once into a jug or pail, or other convenient vessel filled with the soda lotion, and keep it there until the pain subsides; or the limb may be swathed or encircled with a surgeon's cotton bandage previously soaked in the saturated solution and kept constantly wet with it, the relief usually being immediate, provided the solution be saturated and cold. What is now usually sold as bicarbonate of soda is what he has commonly used and recommended, although this is well known to vary much in quality according to where it is manufactured; but it will be found to answer the purpose, although probably Howard's is most to be depended on, the common carbonate being too caustic.

EXTRACTION OF PRECIOUS METALS BY ELECTROLYSIS.—In a recent number of the *Chemical News*, Messrs. Blas and Miest described several methods for the extraction of the precious metals from all kinds of ores by electrolysis. The following abstract of this paper was given in the *Journal* of the Chemical Society for January: "The authors have discovered that if, in electrolysis, compressed ores are used as anode in a bath of an electrolyte containing the same metal as the metal of the ore, on the passage of the current the ore is decomposed, the sulphur, etc., being precipitated at the anode, while the metal collects at the cathode. Thus, with pure galena in a lead nitrate bath, the separation is complete and easy. If the ore contains silica as well, then the silica remains at the anode. Antimony and arsenic, if present, behave in a similar manner, being precipitated as insoluble oxides. They are easily separated by a subsequent electrolysis. When large quantities of arsenic are present, a part of it combines with the sulphur, and forms realgar or orpiment. When ores containing several metals are operated on, the precious metals, being most easily precipitated, are thrown down first in the metallic state at the cathode under the action of a moderate current. The final separation of these metals requires very little battery power; for the mass of metal, when dissolved under the action of the current, regenerates sufficient heat for the ulterior separation of each metal separately. The products at the anode are extracted and purified by treatment with carbon bisulphide, and afterward by separate electrolysis. The decanted carbon bisulphide solution of sulphur is distilled, the latter being left pure. If the ore is a polysulphide, and is mixed with much iron, sulphur and iron oxide are obtained in the first operation. These are best separated by electrolyzing in a dilute sulphuric acid bath; pure sulphur is obtained at the anode, and basic iron sulphate at the cathode. By this process, 1½ horse-power is required to produce one kilo of copper from a sulphurous ore in one hour. As an example of the working with a complex ore, they describe the treatment of an argentiferous lead ore containing iron, copper, and zinc. The current being sufficiently strong, the iron and zinc will dissolve as readily as the other metals, but will not be precipitated so easily, therefore the solution will gradually become saturated with iron and zinc; the current is then regulated so that only the lead, silver, gold, and copper are precipitated on the cathode, while the zinc remains dissolved as nitrate. As the bath becomes saturated, the iron yields to the zinc, and is precipitated to the bottom as ferric oxide, and as soon as the solution is nearly saturated with zinc nitrate, it is siphoned off; the metals are then removed from the cathode, the sulphur and silica from the anode, and the iron oxide from the bottom, of course all separately. The sulphur, etc., and the metals are treated as above described. The zinc nitrate solution is treated with a small quantity of zinc oxide, which throws down the iron; the lead, copper, and silver retained are precipitated by passing a current through the solution, using a zinc anode. The pure zinc nitrate may be treated by a stronger electric current if metallic zinc is required, or if chemically, zinc oxide is wanted."

FURNACE, MILL, AND FACTORY.

The Phosphor-Bronze Smelting Company, of Philadelphia, has improved the quality of its wire recently, by obviating the tendency to kink. It is remarkable for its resistance to the corrosive action of smoke, acid fumes, or mine water, is claimed to possess a tensile strength equal to four times its weight per mile, which is 40 pounds for No. 18 gauge, or 0·049 inch diameter. Mr. W. D. Sargent, electrician, reports its electrical resistance to be about one half of that of iron wire of equal weight.

The heaviest iron ever worked in the Trenton rolling-mill was turned out recently. It consisted of two 15-inch girders, each weighing 4100 pounds before being charged. Twenty-two men were required to put them in the furnace, and double that number to roll them. When taken from the furnace, the girders measured each 54 feet long.

Benjamin, Fischer & Mallery's new works at South Chicago are completed and in operation. The main building is 210 feet long by 55 feet wide, and two stories high. The foundation is 48×102, with cupola outside having a capacity of thirty tons a day. The blacksmith-shop is 40×40, and contains four fires. The power for the works will be supplied by a 40 horse-power Atlas engine and a 60 horse-power boiler. From 150 to 200 men will be employed.

Several very important decisions were reached at the recent meeting of the stockholders of the South Tredegar Iron and Nail Company. The mill, after being considerably enlarged, will be run day and night. One thousand hands will be employed. Great improvements are destined to take place in the nail department, and 1200 kegs of nails, 500 kegs of spikes, and 100,000 pounds of splice bars will be the daily output. These enlargements will doubtless result in the building of a blast-furnace near the plant very soon.

It is said that the old Otis Tube-Works, Cleveland, O., will be started up as a branch of the National Tube-Works Company.

It is said that a stock company is soon to be formed which proposes erecting a large rolling-mill just east of Winooski, Vt.

A citizen of Connellsville, Pa., has offered to furnish any manufacturing company that will locate there a sufficient number of acres on which to operate its works. It is also understood that another property-owner will make a like offer.

A Hartford concern has recently received an order for a self-steering, traction, portable steam-engine, with a portable circular saw-mill, to go to Antuco, Chili. It is also negotiating for the shipment of a similar engine to Australia.

The Harlan & Hollingsworth Company, Wilmington, Del., has cast a condenser weighing 17,000 pounds, for the steamship Pensacola, now building at its yard.

Henry Disston & Sons, manufacturers of the Keystone saws, tools, etc., report consumption of raw materials for the year 1882, at their principal works at Philadelphia, as follows: 21,000 tons of coal and 10,000,000 feet of lumber. They made and worked into edged tools 80 tons of steel per week, besides 450 tons of bar steel for files. They turned out 1,692,000 single saws, 3810 large and 39,000 small circular saws, 1,250,000 long saws, 201,509 dozen files, besides a large quantity of miscellaneous tools which were made in the jobbing department. In this establishment are employed 1300 men, whose aggregate wages amount to over $18,000 per week.

George Felber, of St. Louis, manufacturer of machinery, is furnishing the St. Joe Lead Company, Bonne Terre, Mo., with eccentric jigs, screens, tanks, etc., for its new works now building. He is also doing considerable repair work for the same company.

D. M. Dillon, boiler-maker, Fitchburg, Mass., is making a five-foot steel tubular boiler for Lee, Blackburn & Co., woolen manufacturers, of Lawrence, Mass. This boiler will be set with the Jarvis patent furnace, and use the Sheffield grates, burning screenings and soft coal for fuel.

A combination has been formed in the South, composed of all the coke iron furnaces in the States of Tennessee, Alabama, and Georgia, with the exception of the Oakdale (Tenn.) furnace, to be known as the Southern Coke Association. The object of the association is to obtain and maintain a uniform scale of prices, and prevent indiscriminate competition. A uniform scale of prices has been agreed upon, and agents are required strictly to abide thereby, allowing concessions to no one, no matter how large his order for iron may be. It places all brands of iron on the same platform, so that the furnace making an iron of low standard will get the same price as for the high standard.

The latest achievement of the great 17-ton steam-hammer at the Black Diamond Steel-Works of Park, Brother & Co. was the manufacture by it of a large roll for the sheet mill, the ingot weighing about seven tons. This is said to be the first hammered roll ever made in this country. Heretofore they have been cast.

Alfred Box & Co., Philadelphia, have completed and put in operation in their works an exceedingly ingenious and successful special milling machine, which cuts the threads in the concave screw pinion used in the Box patent screw hoists. The arrangement of this machine is so perfect that, without any changes, save of motion and adjustment, any of the various sizes of pinions may be cut with equal facility. Both the cutter-shaft and shafts revolving the pinion have a separate and positive motion. The cutter-shaft has an automatic feed with a stop motion when the proper depth of cut has been made.

The new vitriol works erecting at St. Louis will produce daily about 300 barrels of copperas, sulphate of copper, and sulphate of zinc. The raw materials used will be the waste acid products from the Harrison Wire-Mills, together with wire and sheet scrap, which have heretofore been counted worthless, but which, under a new system, will be turned into a product worth about $100,000 annually.

The resumption of operations at the rail-mill of the New Jersey Steel and Iron Company, at Trenton, N. J., gives work to about 150 men. Several hundred men in other departments of the mill will continue idle till the puddlers resume work.

The capacity of the Henry Clay Furnace, at Reading, Pa., has been increased from 150 to 200 tons, by raising the furnace twelve feet. It has been blown in.

The Alton Rolling-Mill Company, Alton, Ill., has been incorporated; capital stock, $25,000. The incorporators are James T. Drummond, Charles H. Randal, James W. Kerr, John Haynod, Frederick W. Drury, and W. Pierce.

The union men locked out of the Vulcan Works at St. Louis, think that they will ultimately win. All of the Indianapolis men brought on to St. Louis have returned, and the union men seem confident that they can keep others away.

The Lanesboro' (Mass.) iron furnaces, which have been lying idle awaiting the decision of Congress on the tariff, are to be started up.

Among the recent improvements at the Girard furnace is a new hot-blast, large steam cinder crane air-hoist for lowering and raising the bell, and an addition to the casting-house. It is expected the furnace will have a capacity of 120 tons per day.

The Mahoning Valley Iron Company this week placed in operation one of Caddick & Co.'s patent puddling-furnaces. It is claimed for this furnace that there is a saving of 40 per cent in fuel used over the old furnaces, that the iron is improved, and but a small amount of scrap used.

The Edgar Thomson Steel Company is testing the limestone on Isaac Sherrick's farm, two miles northeast of Mount Pleasant, with a view of purchasing the farm. A $32,000 blowing-engine is building in Milwaukee, Wis., for the works of this company.

During the month of February the Aurora, Ill., smelting-works received thirty-one cars of bullion from the mining regions, and thus far this month their average receipts have been four car-loads daily.

GENERAL MINING NEWS.

ARIZONA.

The latest dispatches state the following: The jury has disagreed in the suit of the Knoxville against the Christmas Company.

BENSON.—The smelter has been running steadily for some time on ore from the Santa Rita Mountains.

TRANQUILLITY.—It is said that a body of $400 ore was struck in the mine recently.

CALIFORNIA.

SIERRA COUNTY.

BALD MOUNTAIN EXTENSION GRAVEL MINING COMPANY.—A telegram from Forest City, Cal., says: This company has struck gravel in its tunnel, with the channel well defined and extending up the ridge northeasterly. This is regarded as very favorable to the region, as there is no doubt a great extent of unworked channel in that direction underlying the deposits of lava.

CALAVERAS COUNTY.

HOOSIER.—The mill started up last week, and after a short run, a clean-up was made which far exceeded expectations. The rock which was crushed was taken from the dump as it came, and yielded $7 per ton. This was considerably more than it was calculated the rock would pay.

ROUGH DIAMOND.—Some more gravel was struck in this mine in Chili Gulch. Twenty-three car-loads were put through the mill recently, which yielded $2 to the car-load. This gravel was near the rim, and was extracted with greater facility than a great deal of the other which requires farther transportation to get it to mill.

INYO COUNTY—BEVERIDGE DISTRICT.

ELGIN.—This mine is situated eight miles north of the Keynot mine, and about sixteen miles from Independence. No work of any consequence had been done on the claim until a short time ago, when operations began. The vein is favorably situated for working both the mine and ore, being within one and a half miles of plenty of water and wood. The ledge shows itself on the surface for a distance of 1000 feet, and at the point where work has been commenced, the vein shows a width of three feet of rich gold quartz. Average samples assayed give from $80 to $120 per ton in gold.

GOLDEN STAR.—The shaft has reached a depth of 100 feet, showing a fine vein of ore in the bottom, twenty inches wide. It is the intention to sink 30 feet more, and then begin drifting on the ledge. The ore will be hauled and worked at the Brown Monster mill. Three average assays made lately gave, gold, $77; silver, $43 per ton.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official report for the week ended March 10th shows: Tons of ore crushed, 138·78; average assay value of pulp, $41.65 per ton; of tailings, $4.87. The east cross-cut, 1000 level, is 280 feet long. The inflow of water is unchanged, the pumps making about 8¼ strokes per minute. North drift, 800 level, is 277 feet long. A small station 5 feet deep was cut out on the west side, in which to place a fan to supply air to the men in this shaft. South drift, 770 level, is in 57 feet. From winze No. 6, at the 672-foot level, a drift was started on the 3d instant, to open another block of ore between this and winze No. 9, lying about 70 feet north. The drift has advanced 14 feet, and is opening up some good ore.

STANDARD CONSOLIDATED.—The official report for the week ended March 10th shows: East cross-cut, 1000 level, in 1256 feet. South drift from east cross-cut, 700 level, in 534 feet, showing the vein 3 feet wide. The west cross-cut from north drift is 92 feet long, and is in hard blasting rock. North drift No. 1, 500 level, is in 540 feet; the vein is 12 feet wide. The total length of north drift from south uprise No. 1 is 86 feet, and the vein is 7 feet wide. South drift No. 2, 385 level, is 349 feet long, and shows the vein 5 feet wide. Uprise No. 4 has reached a hight of 101 feet, where the vein is 6 feet wide.

SYNDICATE.—The east and west workings have been connected, and the mill will start up on the 24th for a long run.

CANADA.

NOVA SCOTIA.

The report of the Inspector of Mines has been presented in the House of Assembly. It shows that the total yield of gold during the year was 14,107 ounces 3 pennyweights 20 grains, against 10,756 ounces 13 pennyweights 2 grains during the preceding year. This is the largest yield since the year 1871, except during 1877, when production rose to 16,882 ounces. Discoveries of copper ore were reported from Malagash, Digby, and Dalhousie, and some prospecting was done at Seal Island, Bras d'Or, and St. Ann's, C. B. The mines of the Steel Company of Canada, at Londonderry, were kept in full operation during the summer. The No. 7 level has opened up a valuable range of ore. In the West mine, in Cumberland, and in the Cook's Brook mine, a small extraction of ore was made. Some ore was also taken from the North vein. A compact red hematite of good quality was found near the village of Maitland, and at several points farther west. Specular iron ore is reported to have been found at Roman Valley, Guysboro'. The Crane Iron Company, of Philadelphia, has taken out 3000 tons of ore from its mine at Salmon River Lakes, Guysboro'. At present, the best means of transporting ore to a good shipping place in Chebucto Bay is under consideration, and mining has been stopped. The ore is said to be of good quality, and the deposit appears to be of unusual size. The work, so far as carried on, has proved that the lead is from 25 to 35 feet wide, and that these dimensions hold good to a considerable depth.

COLORADO.

BOULDER COUNTY.

THE TELLURIDE ORES.—A reliable correspondent sends us the following: The most extensive district where mineralized veins of rock carry these kinds of ores, so far as known, is located in Boulder County, Colo., with the vicinity of Gold Hill as its discovery place and approximate center. The location of this town is upon a divide between Left-Hand Creek on the north and Four-Mile Creek on the south, the former an affluent of St. Vrain's, and the latter a branch of Boulder Creek, into which it merges three miles above Boulder City, and nine miles from Gold Hill by the water-grade road down Gold Run ravine. Boulder City is located at the base of the Rocky Mountains, on Boulder Creek, at an elevation of 5600 feet above the sea. Gold Hill is within fifteen miles of the summit of the Rockies; elevation, from 8600 to 9300 feet.

The mineral veins or lodes have a general trend from northeast to southwest, while the main chain of mountains runs nearly south. Some lodes run nearly east and west, carrying iron pyrites and free gold. Three very heavy lodes run nearly north and south across this belt, at intervals of three or four miles, and are charged with silver ores, such as gray copper and antimonial silver. Tellurides are mainly found in chimneys of from 30 to 200 feet in length, in the southwest veins mostly, accompanied with seams of pyritous iron and a sparry or hornblende gangue; indeed, softer hornblende is a main characteristic of all telluride veins, especially in surface rock or blossom.

The geological formation is mostly granite, though there are some rich telluride veins in the gneiss or serpentine. The old red sandstone lies from one to two miles within the east border of the mountains, and from thence westerly there is a north and south belt of granite in this county over six miles wide, reaching to the town of Gold Hill. Farther west, the serpentine sets in for about six miles, when another body of granite begins, reaching to and over the mountain summits. The veins in the main range granite carry galenas, native silver, gray copper, etc. The first of the large cross-veins, going westerly, crosses Gold Hill along the west border of the granite, and is known as the Hoosier, though there are many locations upon it, one of the best being the Yellow Pine, on the divide between Four Mile and Boulder creeks—a great chimney of $600 ore in gray copper form. Some of the telluride veins cut through this cross-vein: it is not known yet whether all the strong ones do. But few of the southwest lodes pay after passing west into the gneiss; and where they do, the veins carry silver largely, and less gold. The camp called Magnolia, six miles south-southeasterly of Gold Hill, at the apparent south end of the Hoosier vein, and south of Boulder Creek, has many rich telluride lodes, mostly in gneiss, while there are several more such veins near Boulder Falls and around Sugar Loaf Mountain, five or six miles west of Magnolia, also in gneiss. Again, the John Jay, Last Chance, and Smuggler lodes, from five to eight miles north of Gold Hill, rich in tellurides, are also in gneiss, as are the Bondholder, Prince, and some others two miles north. The Golden Age, however, and contiguous veins beyond the Seltzer Springs at Jamestown, and others near those springs, are in granite; likewise, the numerous lodes at Sunshine and at Salina, and others down within four miles of Boulder City, quite as rich as any. This mineral belt at present extends about fifteen miles in length by from six to eight in breadth.

There are probably not less than three hundred mineral veins in this belt that carry telluride ores: about one third of them have been patented. Hardly a week passes during the summer season but some old, worthless vein, by such gradual development as its owners are able to bestow upon it, proves up its worth by a showing of rich telluride ores; not in one particular camp in this belt, but in different portions, showing that what is wanted to make it one of the best localities for investment in the country is capital judiciously spent in developments. There have been, during the past twenty or more years, a few men of means here, on flying visits of a day or two; but very few came with any intention of careful examination for the purpose of working veins, like the owners of the Cold Spring and the Slide; and when most strangers do come among us, they come in tow of some middle-man who is seeking to swindle them in a trade by outrageous brokerage. If capitalists desire to invest in good mines, common discretion ought to teach them to employ a mining expert in these ores as well as in general mining; and, after making careful examination and assays, buy from first hands—the original owners. There is hardly one of these but will extend all due courtesies, and either bond, lease, sell, or give an interest in his property for a specified amount of work in development; but he is afraid of stock operations, and does not wish to stock mines unless the amount is limited, and it is made unassessable. More than one million of dollars could be judiciously invested in this belt of mines, chiefly by running tunnels on some vein that would cut many others, and at the same time drain the lodes, and allow the stoped ores to be brought out where they could be worked or carried away easily and cheaply.

Few persons outside of this immediate section have any idea of the richness of these tellurides. They go by various names, each of which to the expert suggests its commercial value, from telluride of lead (altaite), worth $100 a ton, to common tellurium, valued at from $3000 to $6000 a ton, and so on up to sylvanite, petzite, and calavarite, containing, according to Dana's *Mineralogy*, from forty to eighty per cent of gold by weight. As gold is usually held by miners at $20 an ounce, or $240 a pound, it will be readily seen that sylvanite (a common ore here) is really worth (60 per cent of gold) $140 a pound, when free of rock. I saw a sack of such ore from the Ingraham mine at Salina, last summer, which was taken to the Exhibition at Denver, that was four inches thick of solid sylvanite—worth not less than 50 per cent of gold, and yet could not be sold for over $18.60 a pound. Why? Because the assayers in Colorado do not use more than twenty grams of flux to one of mineral in assays. While it is true that twenty to one would be sufficient to flux all the gold in $100-ton ores, it is also true that the quantity of flux should be doubled for every two hundred more of value shown by the first test, in order to approximate the true value. For instance, if tellurium or sylvanite shows $1000 a ton with twenty grams of flux, the check-assay should be with five times the flux, or one hundred to one, and the result, instead of $1000, would probably be $10,000. The Cold Spring owner sold to Professor Hill, some few years since, about 600 pounds of petzite for $10,400 per ton on a thirty to one flux; according to Dana, that ore was 60 per cent gold, or $140 a pound, or $84,000 for 600 pounds. It was carefully hand-dressed, and if half its weight was stone, still there was a great loss in assay. A professor of the Smithsonian Institution, experimenting on "American" ores at Sunshine, a few years since, demonstrated these facts to the manager, Prof. J. Alden Smith, so satisfactorily, that Smith would not afterward sell any first-class ores to smelters in Colorado, but shipped them East or to Europe.

The Colorado smelters have made fortunes out of Boulder County tellurides in this manner, and the only possible remedy I can see would be a combination of the mine-owners to get up a smelter to treat their own ores; but the miners are so poor that few of them have any surplus from their more expensive mining, as greater depth is attained, to invest in smelters, however profitable it might be afterward. I might add here, that Professor Sewall, of Boulder University, told my informant that "the telluride miners got but 12½ per cent of what was in their ores when sold."

There ought to be a smelter located at or near Boulder City, built expressly to treat this class of ores, and it ought to be run by or in the interest of the mine-owners—not one mine, or half a dozen, but a custom-mill or works for this section exclusively. In a few years, it would save millions that are now coveted by a few, or sent to the winds in vapors. Tellurium will evaporate almost as easily as quicksilver, and the gold therein goes along. I have seen a muffle that had been used but three times in assaying about one dozen samples of ore in scorifying-cups, whose inside was liberally sprinkled with condensed gold sent off by evaporation, and this while both ends of the muffle were open part of the time, from the open air into the furnace-flue. Custom assayers keep their furnaces too hot. Gold melts at about 2000 degrees Fahr., and the litharge flux at 700 degrees or less; combined, 1500 should suffice for fluxing; but a rod of iron will melt readily in any assay-furnace in constant use, and it takes 4000 degrees to melt wrought-iron: no wonder there is such waste of gold. The smelters, however, lose nothing; for in treating rich ores, they melt them under a bath of cheaper metals, such as galena, and so save wastage.

One great advantage in mining in this section is owing to the mildness of the climate. Snow rarely falls as deep as three feet, and then soon goes off before warm west winds or a warmer sun. About half the winter, the ground is bare most of the time, and seldom does the thermometer run down to 20 degrees below zero; much of the time it is between 30 and 50 degrees above. The past January has been one of the coldest known here—several days from zero to 36 degrees below; and a snow-fall of three feet, the greatest ever known here in January. There is about one foot at present—February 16th—with the air at 50 degrees above. Such a thing as a snow-slide was never known in the mines of this county, not even at Caribou, at the timber-line, five miles from the range summit.

Transportation facilities may be called good for a mountain country, there being two water-grade wagon-roads, one down Left-Hand Creek, and the other, mentioned before, down Gold Run, Four-Mile, and Boulder creeks, besides a third along the dividing ridge between the two. The Union Pacific Company last season graded a narrow-gauge road up Four-Mile, and so on toward Caribou, and is now laying rails and building bridges. This road will be opened in the spring, and will come within three miles by the present road, near Salina on

Gold Run. Another narrow-gauge road is completed in grade from Longmont into the opening of Left-Hand Creek at the plain's edge, and is designed to be built up that creek to Ward District, passing Gold Hill within one mile. The grade is easy, and it cuts clear across the telluride belt, as does the other road, near its geographical center. They are coming none too soon for the fuel question, as wood is scarce at $5 a cord, while coal at Boulder is but $3.50 a ton.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL.—This company is putting up a plant of machinery to furnish ventilation in the Corry City lode, which has been lately intersected in the tunnel, a distance of 2100 feet, and at a depth of 1500 feet.

WOLVERINE LODE.—This mine, situated at the junction of Democrat and Republican mountains, is worked at present by two men. They are working a rise from the adit-level, which is now in 430 feet and is 150 feet in depth from the surface. The ore shows some fine specimens of native and wire silver.

DOLORES COUNTY.

With the opening of spring, extensive preparations are making by many companies at Rico to work their properties the coming season.

GRAND VIEW MINING AND SMELTING COMPANY.—The furnaces at the smelter have been steadily running all winter, supplied largely by ore from the company's mines, the Grand View, Yellow Jacket, Phœnix, etc.

UNCLE NED.—Steady shipments are made to the Grand View smelter. The mine is under lease until May 1st, when the owners will make extensive developments.

ZULU CHIEF.—Work for the season has been begun with a fine outlook.

NEWMAN GROUP.—This group, including the Newman, Chestnut, and Swansea, has been leased for four months, and work already commenced.

BOWEN.—A suburb of Rico, first opened up last year, has lately developed most favorably. A large quantity of high-grade ore has accumulated on the dump of the Little Susie, which will be shipped to Rico for treatment as soon as the trail now building is completed. LINWOOD O. TOWNE.

GILPIN COUNTY.

FOOTE & SIMMONS.—The main shaft is 515 feet in depth. Work is prosecuted in the lower east and west levels. In the east level, a good ore-body is being passed through. But little ore has been removed below the 300-foot level. This will afford a good ore-reserve for stoping as soon as the present lower levels are driven to a greater distance. The mill-dirt is crushed at the Empire Mill in Black Hawk, but no clean-up has been made since the present manager took possession of the mine.

UNITED GREGORY.—The company is raising 9-ounce ore through No. 2 shaft, taken out at a point as far west as No. 11.

HINSDALE COUNTY.

CROOKE SMELTING-WORKS.—The works are running to their full capacity.

LAKE COUNTY.

BIG CHIEF.—Work will be resumed at this mine.

BROOKLAND.—The company is overhauling the pumping machinery preparatory to beginning active operations, strengthening the foundations of the plant, putting in a new driving-wheel, and making excavations for a new balance-bob half-way down the shaft, to lighten the weight of the rods. This is a ten-inch pump, and as soon as the improvements noted are completed, which is expected by the 20th instant, the water, which stopped all further progress last fall, will be placed under control. At the time work was shut down, there were thirteen feet of ore in the bottom of the shaft, running from fifteen to forty ounces in silver, and sixty per cent in lead. The extent of the ore-body had not been demonstrated.

CLONTARF.—The mine has spent $30,000 in vain endeavors to control the water, will commence work early in the summer.

IRON SILVER.—A strike is reported to have been made in the Lime claim of this group, which is worked under a lease by Fred Beaudry and others.

OURAY COUNTY.

Six stamp-mills with a total of seventy-five stamps will be on operation on the San Miguel the coming season, namely, the Pandora & Oriental, 20 stamps; Andrus's stamp-mill and concentrator, 10 stamps; Golden Group, 10 stamps; Strout's sampling-works and concentrator, five stamps; Gold King, 20 stamps; Church's mill, 10 stamps; the last two named are on Turkey Creek. The Upper San Miguel Company, whose machinery is all on the ground, will in all probability have its mill in operation before fall.

PARK COUNTY.

NESTOR.—The company is pushing development-work on all its property with a large force of men. It has a large amount of ore now mined ready for shipment. The properties consist of the Robert Keeley, Montgomery, Silver Leaf, Gold Leaf, Winchester, Illinois, and Ensign. The development is doing principally through the Keeley shaft No. 2, which is about 120 feet deep. At a depth of twenty-five feet, a cross-cut was run in to cut the vein, which was found to be about nine feet wide. At a depth of sixty-five feet, another cross-cut was driven, and the vein was found to be about five feet wide. The shaft will be sunk to a depth of 130 feet, and a third cross-cut will be run in.

WYANDOTTE.—At present only one shaft is at work. As soon as the president of the company arrives at the mine, extensive operations will be commenced.

SAN JUAN COUNTY.

ROGER LODE.—A rich copper strike was made in this lode recently. This mine already shows a big body of galena. The mineral runs 30 per cent copper.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—The financial statement for the year ended March 1st, 1883, just received, shows that 5983 tons of ore were shipped during the year, which yielded about $108,000. The royalties from lessees amounted to $16,514.57 and the balance on hand March 4th, 1882, was $29,614.86. Among the disbursements are: Mining expense, as per superintendent's reports, $81,482.10; general expense, as per superintendent's reports, $21,908.82; legal expense, as per superintendent's reports, $12,449.60. The balance on hand at New York office, March 1st, 1883, is reported at $9729.87, and the balance at the mine on February 1st at $4354.36.

DAKOTA.

FATHER DE SMET.—The superintendent's report for the week ended March 18th shows: Ore extracted from first level, 800 tons; second level, 700 tons; third level, 375 tons. Ore milled, 1925 tons. North end tunnel in 839 feet; third level header in 153½ feet; tramway level rise up 24 feet. Golden Gate header running north advanced 19 feet.

HOMESTAKE.—This company's property consists of five mines under one local management, each owning its mines and mills. There is nothing new to report other than semi-monthly clean-ups and shipments, which, by careful sampling of ore, maintain an almost unvarying average. Superintendent McMaster has so thoroughly systematized all work pertaining to the mines that although over 700 names are on the monthly pay-roll, miles of water-ways to be kept in repair, twenty miles of railroad to be protected from obstruction, a vast wood and timber supply secured daily, and over 2000 tons of ore delivered at the mills every twenty-four hours, there is never a hitch and very seldom an accident. Everything moves as if by clock-work, and not an employé holds a sinecure or is superfluous.

ORO FINO.—It is stated that this mine never looked better than at present. The ledge is vertical, and has a known width of 80 feet, every portion of which will pay handsomely. There is no waste-dump, every thing passing through the mill.

GEORGIA.

The Dahlonega *Signal* says that considerable prospecting is going on in different parts of the mining districts and many discoveries made. The prospects at the various mines continue to be favorable.

IDAHO.

QUIMBY HILL.—These mines were sold to a New York syndicate recently. The mines are forty miles north from Hailey, on the mountain summit two and a half miles northeast of Galena, and are above the timber-line. Considerable very rich ore has been extracted, and some shipments made last year to the Hailey sampling-works prove it high grade.

SENATE MINING AND SMELTING COMPANY.—The mine is opened by a tunnel to the vein, and a shaft to a depth of 250 feet below the croppings. One hundred tons of ore were packed down last fall to the company's smelter, near Galena. The smelter made a short run before being closed by severe weather, which prevented the hauling of flux to complete the run. The ore averages over 100 ounces silver, with a five-foot vein, which looks better as depth is attained. A large force of men will be employed in the spring in active development of the property.

MEXICO.

Dr. Allen, with a party of Indianapolis capitalists, has gone to Mexico for the purpose of examining mineral property.

CABORCA.—The superintendent reports that he believes there is sufficient water on hand in the wells to enable the mill, which is now running, to turn out from $15,000 to $20,000; and that the pulp-assays of the ore now worked average over $40 per ton.

EULALIA SILVER MINING COMPANY.—The work done in the mine shows a tunnel 760 feet long, eight feet high by seven wide, which is intended to tap several mines; and on the opposite side of the ravine from this tunnel, is another called the Adventure, 275 feet long, which opens out some exceedingly rich ore. Both of these tunnels are rapidly pushed forward while a large force of men is busily engaged in taking out ore from the different mines. The company has planned the construction of a narrow-gauge railroad from the mines to the mill, which is to be built on the Chihuahua River, close to Chihuahua, by Messrs. Fraser & Chalmers. It is stated that the cost of the erection of the mill will be about $80,000. It will be able to treat from seventy-five to one hundred tons per day, and is expected to be in full operation by May next.

PACHUCA DISTRICT.

A correspondent of the Mexican *Financier* writes as follows:

A general meeting of the shareholders of the Estrella and Alta Gracia mines was recently held in Pachuca. A vote of thanks was given to the retiring board, and the following were elected a Board of directors for the present year: Messrs. Horncastle, Foote, Jackson, Petheric, and Gorgollo.

A special meeting of the stockholders of the Santa Gertrudis mine was held in Pachuca during the week, having been called by a majority of the stockholders who had lost faith in the capabilities of their board of directors. The meeting, which was rather stormy, appointed a supervisory committee, consisting of Messrs. Rule, Brockman, and Thomas, passed a vote of censure on the directors, and determined to hold a meeting every Friday, to receive the reports of the committee appointed to supervise the working of the mine. A correspondent writes that the board of directors says that there is no Englishman in Pachuca capable of working the mine, and the English shareholders say that none of the Mexican miners can work the ores. So they seem to have compromised the affair by appointing a Mr. Bolland, about whom both Mexican and English shareholders agree that he is the best person to manage nothing. There is much dissatisfaction at the management of the mine, which is admitted by all to be rich and capable of yielding good dividends.

The Real del Monte Mining Company, probably in deference to public opinion, so forcibly expressed of late, announces that it will resume work in the mines named Ompaques, Santa Clara, San Juan el Alto, Tejocote, Registro de San Rafael, Rincon Grande, and San Luis, of Real del Monte District; and in the Balcon, Xomulco, La Llave, Santa Gertrudis, Milanesa, San Nicanor, and Fortuna, of the Pachuca District. The company has long held these mines under bond, and recently offered to return them to the owners. These, however, refused to accept them without indemnity, alleging that the company had held them idle for many years, for the purpose of monopolizing control of the mining industry. The public is anxious to see whether the activity now promised will be for the purpose of really opening these mines, or of merely complying with the necessary terms of the bond.

MICHIGAN.

The following are the products of the reporting mines for the month of February:

	Tons.	Lbs.
Calumet & Hecla	1453	1720
Quincy	175	350
Atlantic	153	530
Franklin	151	120
Allouez	80	35
Pewabic	69	100
Grand Portage	41	447

HURON.—The bottom of No. 8 shaft is exposing an exceedingly rich run of copper ground in the shape of barrel and stamp work.

OSCEOLA.—At the annual meeting held in Boston recently, the old board of directors, consisting of Joseph W. Clark, Horatio Bigelow, Thomas H. Perkins, George F. Bemis, Charles Van Brunt, John N. Dennison, of Boston, and John Daniell, of Michigan, was re-elected, and at a subsequent meeting of the board Mr. J. W. Clark was elected president and A. S. Bigelow secretary and treasurer.

VALLEY CITY.—According to the Iron *Agitator*, this company has been experiencing trouble with quicksand in sinking its shaft. It has sunk through 40 feet of this troublesome ground, by resorting to iron caissons driven as fast as sinking progressed, and had but a foot farther to drive to reach the ledge, when a vein of water was struck which prevented further progress of sinking for the time being. Added pumps were set at work, and the ledge has probably been reached ere this.

MISSOURI.

The Harris Copper-Works have stacked up at their warehouse in St. Genevieve, 10,420 ingots of refined copper, weighing 135,000 pounds. This is Arizona copper, which they have refined for the Long Island Company, of Globe, Arizona.

MONTANA.

BELL.—Work on the new three compartment shaft is progressing very rapidly, three frames, or fifteen feet per day, being the average advance. The contractor is under agreement to reach the 400-foot station in one hundred days, when connections will be run with the old workings and the mine explored and developed below.

MOULTON.—After a thorough overhauling, the mill started up for another lon

Fig.1

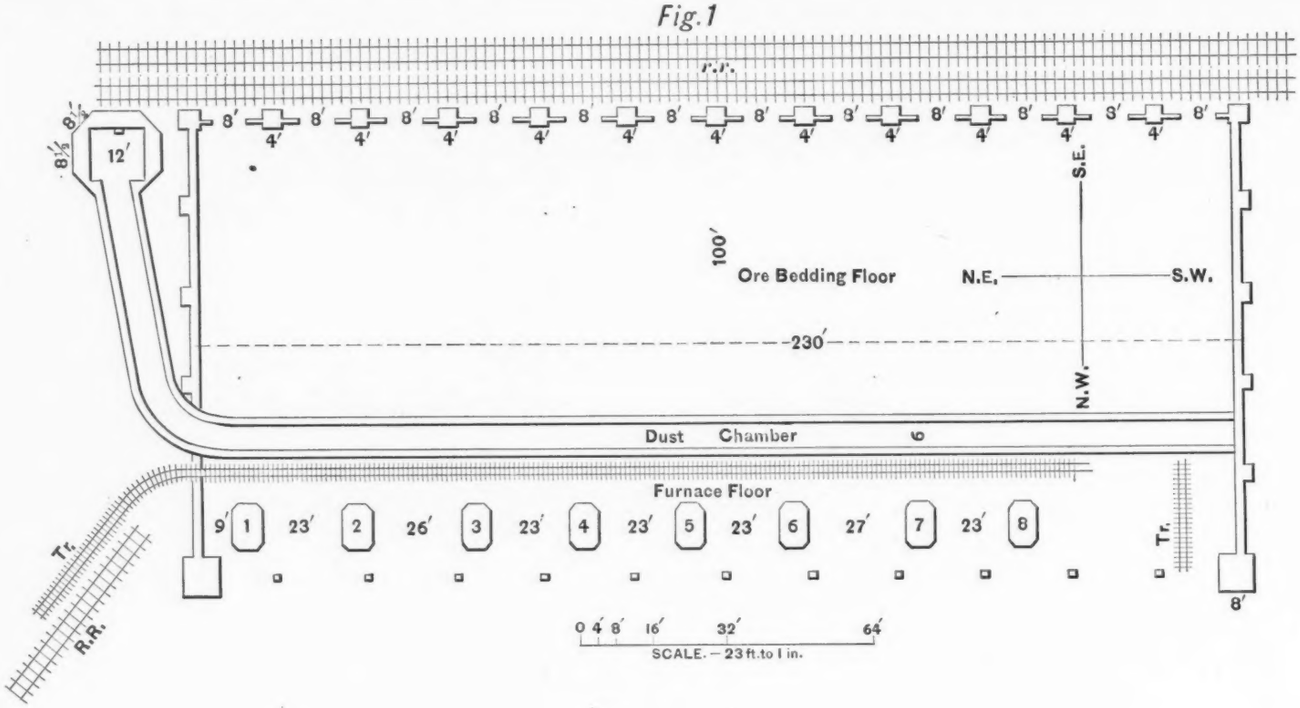

R.R.
8'
8½'
12'
8'
4'
100'
Ore Bedding Floor
N.E.
S.W.
S.E.
N.W.
230'
Dust Chamber
Furnace Floor
9'
1
23'
2
26'
3
4
5
6
27'
7
8
Tr.
R.R.
0 4' 8' 16' 32' 64'
SCALE.—23 ft. to 1 in.

Fig.2

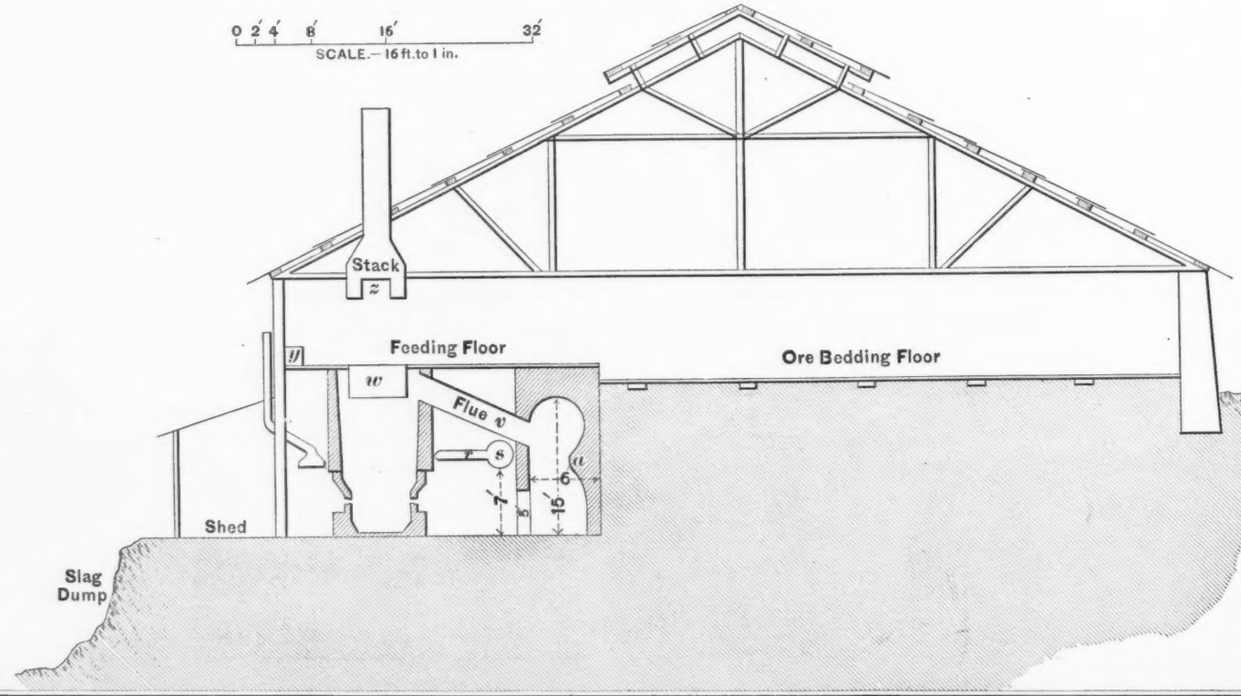

0 2' 4' 8' 16' 32'
SCALE.—16 ft. to 1 in.
Stack
Feeding Floor
Ore Bedding Floor
Flue v
Shed
Slag Dump
7'
15'
6

Fig.3

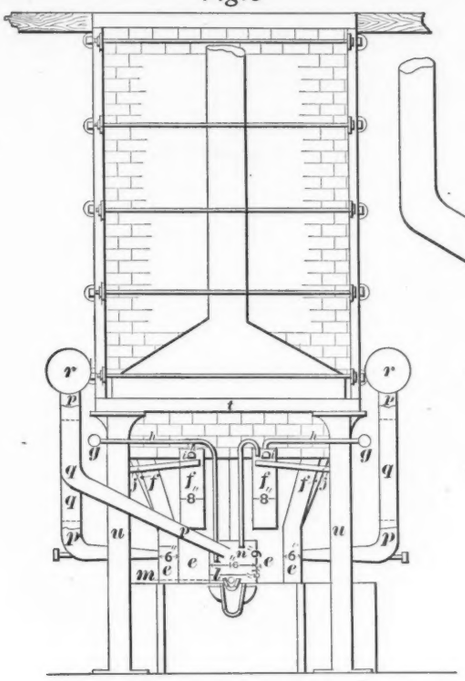
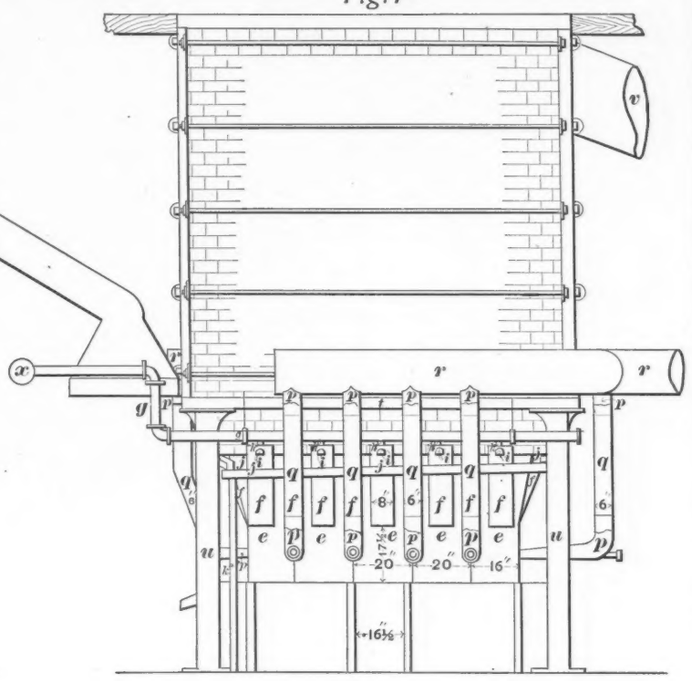


Fig.4



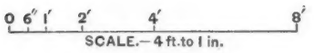


Fig.5

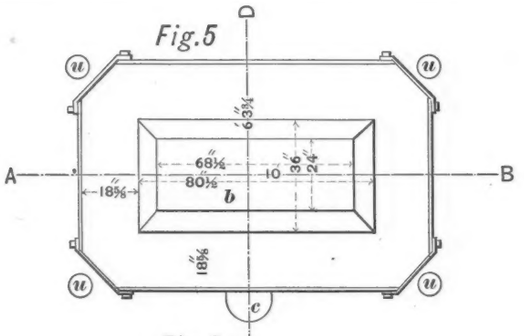


Fig.7

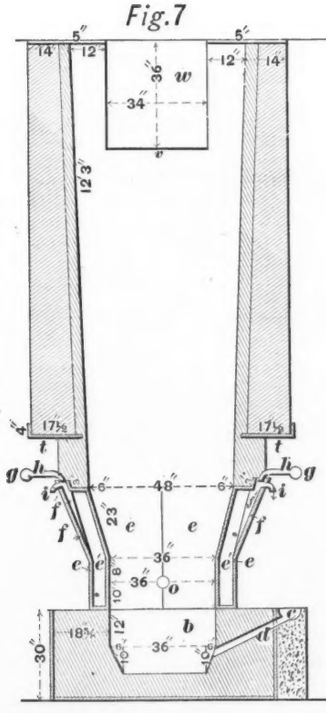
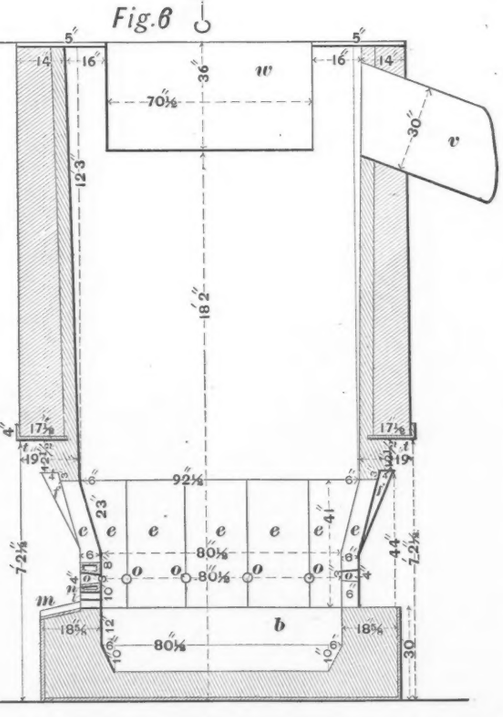


Fig.6



run. The mine is looking well, particularly in the west drift from the 300 north cross-cut, where some very fine ore is extracted.

SHONBAR.—The shaft has reached a point fifty feet below the 185-foot level. The stopes of the east 185-foot drift are showing up better than ever, and the mill returns last week were forty per cent better than in any previous week since the mine became a producer. The first work in the Shonbar was commenced a year ago. During the year, $30,000 have been expended in improvements and machinery. The mine is now running at a profit.

NEVADA.

GEDDES & BERTRAND.—This company's mines, situated near Eureka, continue their output of about $30,000 per month. The leaching process obtains as high a percentage of the gold and silver in the ores as is usual in chloridizing and amalgamating. There is a loss in chloridizing, whether the pulp is thereafter leached or amalgamated. Aside from this loss, which is never taken account of, the leaching treatment of the Geddes & Bertrand mill saves about 85 per cent.

HALE & NORCROSS.—At the annual meeting, held in San Francisco recently, the following directors were elected: H. M. Levy (President), Gustav Reis (Vice-President), George Congdon, S. Heydenfelt, W. S. Hobart, M. Hoeflich, J. B. Russell; Secretary, Martin H. Levy; Superintendent, R. P. Keating; Treasurer, Bank of California; Attorney, S. Heydenfelt.

NEW MEXICO.

MASSACHUSETTS & NEW MEXICO.—Pending the collection of an assessment of 5 cents a share on the stock, this company discharged and paid nearly all its men, retaining only four or five who are now setting boiler and steam-pump, and putting up hoisting-works at the King mine, preparatory to the resumption of active operations at the mines in April. It is not true that the miners have seized the property for wages.

SILVER HILL DISTRICT.—A correspondent of the New York *World* says: This district is situated in the county of Dona Ana. The lodes generally extend north and south, with only slight variations. The capping of the peaks is mostly iron, running from $5 to $8 in silver. In most of the gulches on the eastern slope, placer gold is found in small quantities. In the Rincon, on the eastern slope, copper ore running from 15 to 20 per cent is found as croppings, and the indications are, that the whole place is underlain by an immense copper deposit. In this Rincon is situated the James Fisk group, consisting of the James Fisk, Golden Rule, Providence, and Passaic mines, all showing well for the small development. None of the mines in the southern belt has been developed, 8 to 10 feet being the greatest depth obtained. Select specimens from the Fisk will run 55 per cent copper, and an average assay of ore from all portions of the 10-foot shaft gave a return of 18¼ per cent and 6·1 ounces silver; the vein is over seven feet wide, and the shaft all in ore in a lime and porphyry contact. The Passaic assays 20·4 per cent copper, 4·8 silver. South of the Fisk group are the Diantona and Guadalupe mines. They are on the same belt of mineral, and, being the only mines with any work at all done on them for years, have attracted the most attention, and have been considered the representative mines of the district. Experts report them as fine prospects as any ever seen, and probable rivals of the Lake Superior mines. Surface copper is found all over both claims, running from 15 to 33 per cent. Fifteen feet is the greatest depth obtained on either, and Guadalupe has had silver assays as high as 242 ounces silver. West of the Guadalupe is the Paul Jones group; deepest work, 8 feet; assays, 30 per cent copper, 38 per cent silver. South of the Guadalupe is the Refugio, a Mexican claim, the lode running across the main formation from the northeast to the southwest. The ore is lead carbonate, running as high as 200 ounces in silver.

On the high peaks west of the Rincon are situated the Orphan Boy group, Hobart, Iron Duke, Rattler, and Jarrilla King.

Assessment-work is now progressing on the Hobart and Iron Duke. Throughout this belt are found old workings and numerous dumps of rejected ore that could not be packed the long distance necessary in the days the mines were then worked. There is no authentic history of the working of these mines; but the evidence is, that the work was carried on extensively, one dump alone proving that the shaft must have been down hundreds of feet. The shafts are filled with *débris*, and the dumps partially covered with the wash from the mountains. Most of these shafts are in the Rincon, before mentioned. In the northern end of the mountains are the properties of Knowlton & Co. and Noble & Dougher, consisting of the Jarrilla Queen, owned by Noble & Dougher, down twenty-six feet and showing well in copper—37 per cent copper and nine to eleven ounces silver. It is a very flattering prospect. About 1500 feet west is the Isabella, down fifty feet, showing well in copper, but still badly broken up. Depth is necessary to prove this mine. About four miles southeast is the Egyptian group and the Savage and Lone Star mines. The Savage has the assessment-work done, and telluride ore running 82 per cent has been found. The lode runs nearly north and south through the two locations. The work now progressing on the Lone Star is about fifty feet from the shaft of the Savage. The lead has every indication of a true fissure. There are no blow-outs, but it is a lime contact.

There are many other good prospects—the Three Bear mines, the Juliett, Homestake, Vulcan, Eureka, Little Page, Hope, Lincoln, Honest Indian, Constitution, etc.—in the southern end. The Constitution is a lime and granite contact, the only one thus far discovered in the mountains. Native copper is found in the lead, and the owners are now at work, expecting to sink forty or fifty feet.

SOLID SILVER.—The discovery-shaft on the Black Hawk, the property of this company, is down 60 feet, with levels running east and west at 52 feet. On the east level, there is a winze sunk to a depth of 70 feet, with a level running to the east a short distance. The second shaft is known as the Huneke shaft, and has been sunk to a depth of 115 feet, with a level at 50 feet extending but a short distance to the east. Large bodies of ore have been unearthed in this shaft. Another shaft, called the Josephine, has been sunk on this, the southern vein, to a depth of 42 feet, making three shafts on the vein. The northern or Gopher vein has two shafts upon it, besides levels running to connect them. The shafts are down 42 and 43 feet, respectively. There are two parallel veins upon the Black Hawk claim, on which the work has been done, and both are true fissures. The mines are in excellent shape to begin extensive work upon them, and better mineral than that taken out can not be found—native, horn, and argentite silver. The present development-work justifies the erection of reduction-works.

TORRENCE.—This mine, situated at Socorro, is to be worked to a depth of 500 feet under new auspices.

NEW YORK.

Messrs. Cooper, Hewitt & Co., owners of the iron mines at Toadt Hill, Staten Island, have purchased the Townsend property at Clifton for $21,500.

NORTH CAROLINA.

A large bed of phosphates has been discovered in Brunswick County, on the line of the Carolina Central Railroad, and about eleven miles from Wilmington.

UTAH.

EMPIRE.—The Salt Lake *Tribune* says that it appears McCormick & Co. had the first claim against this company, and some weeks ago secured their claim by attachment on the machinery for a stamp-mill. At the sale of this mill recently, Mr. McCormick bid the property in for the amount of his claim, which aggregates about $10,000. As we understand it, the sale is positive and beyond redemption on the part of the company. This machinery cost at the factory in the East $49,000, and there was paid for freight on it to Park City $17,500 more, making a total of $66,500. The engine has a capacity of 500 horse-power and the machinery is complete for a 30-stamp silver mill, while the power is ample to double that number of stamps and pans.

HORN-SILVER.—A dispatch to the New York *Tribune* states that a part of this mine has caved in. A settling down on the slope of the foot-wall of the old cave of two years ago has occurred. No one was hurt. It has not yet interfered with the working of the shaft.

NEW YORK & UTAH.—This company is about to resume operations. Mason M. Hill, manager of the affairs of the company in Utah, lately arrived from the East, and is perfecting plans to start the smelter belonging to the company. This smelter is located in the valley at the foot of Bingham Cañon.

OLD TELEGRAPH.—It is stated that the works of this company are about to start up, at least in part and experimentally, to see if something can not yet be made out of the Old Telegraph ores, particularly those which are found in a chloridized condition, and therefore adapted to treatment by leaching.

ONTARIO.—At shaft No. 3, drifting both ways is done on the ledge, and good ore is taken out. The shaft is sinking to the seventh level. After reaching a depth of 700 feet, the huge pump will be put to work, which will greatly reduce the cost of freeing the mine of water. Work is also going forward rapidly on the tunnel. At the intermediate shaft, the tunnel is extending both ways, while from the lower end, now in nearly half a mile, good progress is made.

STORMONT.—Mr. Schuyler Van Rensselaer, the secretary, has sent us the following: Our ore, which ran low grade during the past four months, has lately greatly improved, and now averages about $23 per ton. We have been working the Buckeye and Last Chance claims only. Lately very good ore has been struck just north of the Stormont claim, which has not been worked for years. There is every reason to believe that the vein runs into the northern and undeveloped part of the Stormont claim. This will give us a new ore-supply. The Thompson & McNally claims are yet undeveloped.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

CALIFORNIA.

SACRAMENTO CITY DISTRICT.

William F. Hanley, Hanley quartz mine. Nevada City, Gold Quartz Mining Company, Nevada City Extension gold quartz mine.

SAN FRANCISCO DISTRICT.

A. S. Roney, Richard Johnson, and R. C. Simmons, Mountain View quicksilver mine.

COLORADO.

CENTRAL CITY DISTRICT.

Harvey Bradley and Franz Hartman, Edinborough lode. Charles F. Baldwin, Highland Laddie lode. Harvey Bradley, Mary P. Gray, James E. Banta, and Mab A. Banta, White Pine lode. J. S. Barker, Hercules lode. George W. Hall, Crocus lode. R. P. Dewey, Jeph Lee, and George W. Hall, Great Republic lode. George W. Hall, Hartwell lode. Heneage M. Griffin, Dividend lode and mill-site. J. G. Pohlé, Mammoth lode. Charles F. Wells and W. H. Shigley, Alert and Tippecanoe lodes. Springfield Silver Mining Company, Snowy Range lode. John Turner, E. H. Fontaine, William Scholl, and Otto Sauer, Susan Mary lode. Jacob J. Elliott, Dewitt C. Barker, and Louis F. A. Hellman, Donna Juanita lode. Rara Avis Gold and Silver Mining Company, mill-site. William H. Burge, Hayes & Wheeler lode. Charles W. Pollard, Amy lode.

DURANGO DISTRICT.

San Juan Consolidated Mining and Milling Company, Little Giant lode. John Monroe and Dempsey Reese, Many Spur lode. Charles N. Cox, Harriette lode. Lucille Consolidated Mining Company, Lucille and Protection lodes. Charles F. Blossom and John H. Leary, Shetland lode.

LAKE CITY DISTRICT.

Charles E. Schoellkopf and Charles Counselman, Silver Blossom lode. Allied Mines, Crusader lode. Peter P. Kennedy, William J. Edgerton, George L. Waters, and Henry G. Cole, Gilmore lode.

LEADVILLE DISTRICT.

O. H. Harker, George Summers, Daniel Hanley, C. F. Thomas, and E. L. Campbell, Hancock lode. Clifton Consolidated Mining Company, Ouray and Black Bess lodes. John D. Murphy and John Parry, Belle Vernon lode. H. R. Morris and George W. Riley, J. W. Manning lode. Frederick W. Rose, Frederick J. Mathias, John Knodel, Joseph Reither, and William H. Deckschmidt, St. Louis Bay lode. Ruby Silver Mining and Smelting Company, Buckeye lode. Charles Markell and James McLaughlin, Jay Gould lode. George V. Brunk and Freeman Webster, Mammoth lode. George W. Brunk and William Bremrose, Second Advent lode. S. R. Gay, H. J. Stephens, Jr., D. F. Lahman, Finley McMartin, William A. Edwards, and Andrew H. Johnson, Mary Adair lode. Beecher Consolidated Mining Company, Grace Greenwood and Hector lodes, Jacob Houghton, Crown Reliance and Esmeralda lodes. Seth A. McLean, Mud Sill lode. A. McLean, Little Johnny and Revenue lodes. Sundown Consolidated Mining Company, St. Mary's and Little Harvey lodes. Abingdon Mining and Smelting Company, Lizzie Abingdon lode. John Thompson and William Jesse, Brown Queen lode. William D. Sanders, Elk Horn lode. Daniel B. Webster, R. J. Tabley, William B. Tabler, Philip H. Tompkins, O. P. A. Mayers, and Richard C. Tabler, Crockett lode. Lombard Mining Company, Excelsior lode. Charles Markell, Luther A. Casey, Hugh Cowen, John Jordan, James Rush, and Patrick McKenny, Washington No. 2 lode. James Joslin, Boyd Park, William C. Hyde, William B. Stevens, William K. Smith, and Edward F. Roberts, Belle Peabody lode. Virginia City Mining and Smelting Company, mill-site. William H. Eckbert, Henry J. Meixell, Daniel W. Marshall, and Michael M. Howe, Saw Log placer mine. Oliver C. Obey *et al.*, Sierra Nevada lode.

DAKOTA.

DEADWOOD DISTRICT.

Little Grant Gold Mining Company of Dakota, Little Grant lode.

MONTANA,

HELENA DISTRICT.

Sarah F. Murray, Laura Clark, and Michael J. Connell, Arctic lode. William H. Young, Hezekiah Roundebush, James E. Dickey, and Alexander W. Pike, Badger State lode. John M. Stewart and Edward Hickey, Rock Island lode. Myron Hutchinson, Travonia lode. James R. Clark and John A. Leggat, Washington lode.

NEVADA.

CARSON CITY DISTRICT.

New York & Palmetto Mining Company, Pearl, Treasurer, Diamond, and President lodes. H. M. Clemens, Santa Rita lode.

UTAH.

SALT LAKE CITY DISTRICT.

Charles C. Woodhouse and Louis Klein, Esmeralda lode. John J. Daly, Ottawa lode.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 23.

There is very little to say in relation to the mining market this week. Business has been very flat, and has been confined almost entirely to the low-priced fancies. In fact, the whole market has been between the brokers themselves, and has been manipulated to suit their requirements. Below will be found a complete summary. The total sales of mining shares at all the Exchanges aggregate 323,960, as against 456,790 last week.

The Comstock shares have been very quiet and about steady. California, with a small business, was weak, selling, assessment unpaid, from 6@4c. Consolidated Virginia has been quiet and irregular, selling from 50@45@48c., with a business of 3775 shares. Sierra Nevada sold at $3 under one transaction. Union Consolidated has been quiet and irregular, and sold from $5.50@$4.70. Mexican was a little weak, but was fairly dealt in; it sold from $4.13@$3.60. Consolidated Imperial sold at 8c.; it was quiet. Yellow Jacket was quoted at $2.25. Best & Belcher was very quiet, and sold at $4.13. Sutro Tunnel has been almost forgotten; it was very quiet at steady prices, selling from 21@20c., with a business of only 1500 shares.

The Leadville stocks record a small business and have been steady. Amie was active and irregular, selling from 23@26@25c., the sales aggregating 14,400 shares. Chrysolite had a small business at steady prices; it sold from $1.30@$1.35. Dunkin sold yesterday at 28@30c. Hibernia records one small transaction at 3c. Iron Silver had a small business and was very irregular; it sold from $3@$2.75@$2.80. Leadville was quiet and steady, selling from 73@70@72c. Little Chief records a small business and was steady, selling from 39@38c. Little Pittsburg sold at strong prices, under a moderate business, selling from 65@71@70c. Big Pittsburg declined from 17@11c., closing at 14c., with a business of 1000 shares. Climax records a small transaction at 9c.

The Bodie stocks were quiet, and prices were on the decline. Bodie Consolidated, with a business of 1260 shares, was irregular, selling from 90@80@85c. Standard was quiet and a little weak; it sold from $6.88@$6.50. Bulwer records a small business at declining prices, selling from 95@85c. Goodshaw was quiet and steady at 4@5c.

The Tuscarora stocks were very quiet, and record no material change in price. Grand Prize sold at 45c. Belle Isle was quiet and steady, selling from 52@55c. Navajo was also steady, selling from $3.40 @$3.50, with a business of 625 shares. Independence was quiet and steady, selling at 40@43c. Elko Consolidated has been very quiet and very irregular; it sold from 16@10@13c.

In the miscellaneous list, Alice has been very irregular under a small business, selling from $3@$2.70@$2.95. Bassick has suffered a decline, and has sold from $11⅛@$10⅜ under a small business. Eureka Consolidated has been quite weak, declining from $7.25@$5.50; the sales amounted to 1040 shares. The Green Mountain stocks have been very quiet, and record no change in price. Gold Stripe sold at 7@8c. Green Mountain sold yesterday at 78@79c. We learn that the taxes on this property have been paid, the mill has resumed work, and that a loan has been effected of $7500, relieving the company from financial embarrassment. In addition to this, all but five of the bonds have been taken. Rising Sun was quoted at 5c., and Cherokee at 3@5@4c. Horn-Silver has been almost neglected, and has been steady; it sold from $7.88@$8 Northern Belle was dealt in mostly on time sales; it was irregular, selling from $9.50@$9.75. Robinson Consolidated records a very active business, but continues to grow weaker; it sold from 78@62c., then up to 75c. yesterday, and closed at 71c. Sierra Grande has also been very active and has been very irregular; it sold from $2.45@$2.75@$2.40, closing at $2.50 yesterday.

Central Arizona has been quiet and steady at 37@35c. Decatur records a very active business at steady prices, selling at 6@8@7c. Durango was quiet and steady at 9@8c. Eastern Oregon, with one transaction, sold at 75c. Harlem M. & M. Co. has been active and strong; it sold from $1.35 $1.40. Lacrosse records a very active business, but has suffered a slight decline, selling from 18@14c Oriental & Miller has been active and strong, selling from 13 17c. Sonora Consolidated has also been very active at very irregular prices; it sold from 45@34@41c. South Hite, new, was active and strong at 9@14c. South Pacific has had an active business at steady prices, selling at 7@8c. The State Line stocks have been quiet and steady; Nos. 1 and 4 sold at 4c., and Nos. 2 and 3 at 7@6c. Taylor-Plumas records an active business at steady prices, selling from 17@18c.

A suit is about to be begun by several prominent members of the American Mining Stock Exchange against the Mutual Trust Company for an accounting of the funds placed in the hands of the Trust Company upon the organization of the Mining Exchange. The Trust Company was organized by Milton S. Latham, ex-Governor Safford, Drake De Kay, and other prominent Western mining capitalists, three years ago, and under its auspices the Mining Exchange was organized and begun business in June, 1880. Memberships in the Exchange were sold for $1000 each, and it is claimed that this money was to be held in trust for the Exchange by the Trust Company. The Mutual Trust Company (then known as the Mining Trust Company) received $171,000 from this source, as well as other sums from dues, fees for listing mining stocks, and transfer and registry fees, amounting in all to about $200,000. The Exchange members claim that, in a circular issued at the time of the organization of their Board, the Trust Company promised to hold a $1000 government bond against each $1000 Exchange membership. They deny that they were given any notice of the rescinding of this action, as is claimed to have been done by the Trust Company. Vain attempts have been made, it is said, to obtain from the Trust Company an account of the expenditure of this $200,000. The managers of the Trust Company are charged by the mining brokers with having diverted it to their own speculations. About a year ago, the Trust Company increased its capital stock from $50,000 to $2,000,000, and $1000 stock each was issued to the members of the Exchange. Subsequently, this increase was decided in the courts to be illegal. There have been frequent changes in the management of the Mutual Trust Company, the original directors having been ousted from office before a year had elapsed. Since that time, there have been frequent quarrels between the company and the American Mining Exchange over the funds raised for the organization of the latter institution.

The trustees of the Columbia Consolidated Gold and Silver Mining Company recently applied to Judge Truax, of the Superior Court, for the appointment of a receiver and for the dissolution of the company, on the ground that the mines owned by the company could not be profitably worked. The application was granted, and Mr. Franklin H. Smith was appointed receiver. The value of the company's property is said to be not more than $10,000.

MEETINGS.

Colorado Coal and Iron Company, Colorado Springs, Colo. Annual meeting of stockholders and election of trustees, April 2d, at twelve o'clock M.

Legal Tender Gold and Silver Mining Company, No. 7 Nassau street, Room 8, New York City. A special meeting of stockholders, March 29th, at one o'clock P.M.

Lucky Boy Gold and Silver Mining Company, 18 Wall street, New York City. Annual meeting of stockholders and election of trustees, April 10th, at three o'clock P.M.

Peru Steel and Iron Company, 115 Broadway, New York City. Annual meeting of stockholders and election of trustees, April 5th, at three o'clock P.M.

DIVIDENDS.

The Bassick Mining Company, of Colorado, declared a dividend (No. 2) of $100,000, or $1 per share, payable April 2d. Transfer-books close March 28th, and reopen April 3d.

The Contention Consolidated Mining Company, of Arizona, has declared a dividend (No. 14) of twenty-five cents per share, payable March 28th. Transfer-books closed March 17th.

The Sierra Grande Mining Company, of New Mexico, has declared a dividend (No. 6) of twenty-five cents per share, payable April 2d. Transfer-books close March 24th, and reopen April 3d.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, No. 55 Broadway, report as follows for the week ended Thursday, March 22d, one P.M:

The decline in production of the Cooper tract which was mentioned last week continued, and upon the strength of this the market during the past week touched the highest point this year.

Oil opened Saturday at $1.08, declined to $1.00⅛ closing about $1.01¼. Monday morning, it opened $1.02⅝, touching $1.06, at which it closed. Tuesday it opened $1.07½ and climbed up to $1.10, from which it reacted to $1.05¼ at the close in New York, though $1.06 was at the same time bid in Oil City Wednesday it opened $1.06½ bid, sold up to $1.07¾ and down to $1.03.

During the recent sharp advance, the New York market has generally been from ⅛ to ¾ lower than Oil City, as the sentiment here was hardly so bullish as there.

On the 22d, it opened at $1.05, sold down to $1.03, up to $1.05¼ here, though $1.04¾ was the highest in Oil City, at which price it closed for the noon session.

Thus it would seem that brokers here are becoming more bullish. The Cooper tract is falling off in production, which is only about 1200 barrels daily.

It appears that a greater significance is attached to the Cooper tract than facts would seem to warrant; for during the extreme fluctuations of this year, namely, from $1.06 down to .86 and up to $1.10, the fact was always clear that the Cooper tract territory is unreliable, that many wells come in dry, and that those in which oil is found decline rapidly in production after being opened. Thus no reliance could properly be placed upon its continued production, and no reason appeared for any important production in that quarter. The total production of that tract during the last eighty days would not equal 200,000 barrels, yet the surplus stock in the custody of the United Pipe Line Company has increased over 1,400,000 barrels during that time. Deduct the production for this period of the Cooper tract, and the fact remains that the increase has been 1,200,000 barrels from the old districts. This is not a bullish showing; for it means 15,000 barrels daily increase in stock on hand. Oil may advance to higher figures, but there is no scarcity of the commodity, notwithstanding all the "bull" talk, which claims that consumption will soon outrun production. The above figures do not lend much credence to such statements.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
March 17....	$1.02¾	$1.02¾	$1.00⅞	$1.01⅞	534,000
19....	1.02	1.05⅛	1.02	1.05⅛	482,000
20.....	1.06¾	1.09⅛	1.05⅛	1.05⅛	601,000
21.....	1.05⅛	1.06¾	1.03⅛	1.04	428,000
22....	1.04	1.04⅝	1.02⅝	1.02⅝	808,000
23.....	.....	.....	.....	.....	.....
Total sales.					2,853,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 22.

The market for copper stocks has lapsed into a chronic state of dullness and inactivity; the sales the past week hardly warranting the name of a market. Prices, however, are firm, and Calumet & Hecla shows an advance of $4 per share over last week, all the sales being at $240. The reported sale of 10,000,000 pounds of ingot copper for export has created a better feeling among dealers, and has no doubt tended to influence the advance in Calumet & Hecla, that mine being the largest producer in the country. Franklin was exceptionally weak in the early dealings, and declined from $12 to $11, but later it recovered and was in good demand to-day at $12@$12⅛. In Pewabic, there was nothing doing; the reports from the mine are not encouraging; the stock is offered at $6 without takers, the best bid being $4¼. Quincy very dull; sales at $48@$48⅛; a lot of five shares only sold at $49⅛. Osceola declined to $29½, ex dividend. National sold at $1. The annual report of the Huron Copper Company, just published, shows an indebtedness of about $21,000, and another assessment is among the probabilities of the near future.

In silver stocks, the market is dull, and prices generally lower. Catalpa, which is the most active stock on the list, declined on the unfavorable report of the mine for February from 60@45c., with later sales

at 47½c. Crescent also declined from 27½@22½c. Bonanza, steady at $2½. Silver Islet sold at $3. San Pedro declined from 62½@55c. Sullivan sold at $1⅛. Indian Queen, at $1⅜.

There has been but little doing at the Mining Exchange the past week, and the market is without any special feature.

3 P.M.—At the afternoon Board, Calumet & Hecla sold as before, at $240. Osceola, at $29½. A small lot of Pewabic, at $6. Franklin, $12 bid, $12½ asked. Quincy, $48 bid, $49 asked. Atlantic, $10 bid, $13 asked. Catalpa, 45c. bid. Huron, $¾ bid. National, $1 bid.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has displayed more activity and strength than for the past few weeks. The Comstocks have come in for a good share of the business and have shown some strength. There is no news of importance from the mines. The outside stocks remain quiet and firm.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Mar. 16.	Mar. 17.	Mar. 19.	Mar. 20.	Mar. 21.	Mar. 22.
Albion	....	....	....	....	....	....
Alpha	1¼	1¼	1¼	1⅜	1¼	1¼
Alta	7-16	11-32	7-16	7-16	11-32	13-32
Bechtel	....	....	....	....	....	....
Belcher	¾	11-16	11-16	29-32	19-32	¾
Belle Isle	½	½	9-16	19-32	9-16	11-16
Best & Belcher	3⅛	....	3⅜	3⅜	3¾	3¾
Bodie	27-32	27-32	13-16	13-16	29-32	1
Bullion	....	....	....	....	....	....
California	1-16	3-32	7-16	1-16	3-32	1-16
Challar	....	....	....	....	....	....
Con. Virginia	½	½	½	7-16	½	½
Crown Point	15-16	27-32	15-16	1¼	15-16	15-16
Elko Cons	3-16	....	....	....	....	....
Eureka Con	9	7½	....	5⅝	6	....
Exchequer	¼	....	....	11-32	¼	5 16
Gould & Curry	2⅛	2⅜	2⅝	2⅜	2⅜	2⅛
Grand Prize	7-16	....	7-16	7-16	½	9-16
Hale & Norcross	2¾	2¾	2¾	2¾	2⅝	2¾
Independence	13-32	13-32	....	....	7-16	....
Martin White	7-16	¼	7-16	11-32	¼	¼
Mexican	3⅞	3⅝	3¾	3¾	3½	3¾
Mono	3-32	....	....	....	....	....
Mount Diablo	....	....	....	....	3½	....
Navajo	3⅜	3¼	3½	3½	3¼	....
Northern Belle	....	8⅜	9¼	9½	9½	9¼
North Belle Isle	7-16	7-16	½	....	½	½
Ophir	3⅛	3	3½	3	3	2⅞
Overman	....	....	....	....	....	....
Potosi	29-32	15-16	1	15-16	27-32	15-16
Savage	....	....	....	....	....	....
Scorpion	....	....	....	....	....	....
Sierra Nev	2⅞	2⅞	2⅞	2¾	2⅝	2¾
Silver King	....	....	11	10¾	....	....
Tip Top	....	....	....	....	....	....
Union Con	5¼	4⅞	5	4⅞	4¾	4¾
Wales Con	....	¼	¼	3-16	3-16	3-16
Yellow Jacket	2	1⅞	2⅛	2⅛	2⅛	2¼

BULLION MARKET.

NEW YORK, Thursday Evening, March 22.

Owing to a decline in exchange on India in London, and in sterling exchange here, the price for silver in our market is materially lower than the rate of our previous weekly issue.

DATE.	London	N. Y.	DATE.	London	N. Y.
	Pence.	Cents.		Pence.	Cents.
March 17	51 3-16	110¾	March 21	50¾	109¾
19	51	110½	22	50¾	109¾
20	50¾	110	23.	....	....

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 23d, as compiled from various sources, amounted to $184,834.47, as against $348,929.75 reported for the previous week. The receipts from January 1st, 1883, to date are $3,435,563.74.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended March 17th	$765,995
Corresponding week last year	262,235
Since January 1st, 1883	3,226,346
Corresponding period last year	12,496,983

Imports.

Week ended March 17th	$204,110
Corresponding week last year	130,056
Since January 1st, 1883	1,581,916
Corresponding period last year	830,068

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the rate for discount, which remains at 3 per cent. The bank lost during the week £67,000 bullion, and the proportion of reserve to liabilities was reduced from 42 3/16 to 40 13/16, against 45 11/16 in the corresponding week last year. The Bank of France gained 2,400,000 francs gold and lost 5,975,000 francs silver during the week.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	For the week.	Month of February.	Year from Jan. 1st, 1883.
Alice, G. S.	Mont	....	$73,864	$163,905
*Alta-Montana, G. L. S.	"	....	....	†10,625
Bodie, G. S.	Cal	....	....	44,798
Bodie Tunnel, G.	"	....	10,471	22,102
*Bonanza King, G.	"	....	51,355	113,132
*Boston & Montana, G.	Mont.	....	16,883	34,936
*Central Arizona, S.	Ariz.	....	....	15,627
*Christy, S.	Utah	....	....	23,260
*Chrysolite, S. L.	Colo.	....	†30,945	57,435
Contention, S.	Ariz.	....	....	88,694
Crescent, G.	Cal	....	....	13,000
*Custer, G. S.	Idaho	....	....	43,572
*Deadwood-Terra, G.	Dak.	....	38,860	84,556
*Derbec Bl. Grav., G. S.	Cal	....	....	8,337
*Father de Smet, G.	Dak.	....	27,112	69,189
*FriscoM.&S.Co..G.S.L.	Utah	....	21,252	43,923
*Homestake, G.	Dak.	....	103,670	211,348
*Hope, S.	Mont.	....	....	20,574
Horn-Silver, S. L.	Utah	....	276,000	479,000
Independence, S.	Nev.	....	....	10,000
Lexington, S.	Mont.	....	103,315	192,365
*Little Pittsburg, S. L.	Colo.	....	6,768	11,875
*Marguerite, G.	Cal	....	15,600	25,900
Martin White, S.	Nev.	....	55,675	75,082
Moulton, G. S.	Mont.	....	....	41,005
Navajo, G. S.	Nev	....	64,450	144,450
*Northern Belle, S.	"	....	155,916	221,090
*Ontario, S. L.	Utah	....	181,846	364,067
*Oxford, G.	N. S.	....	4,500	7,365
*Satemo, G.	"	....	700	2,500
*Standard, G.	Cal	....	105,320	188,279
Star, S.	Nev.	....	12,299	27,095
*Stormont, S.	Utah	....	15,809	34,834
Syndicate, G.	Cal	....	....	9,217
Tintic M. & M. Co.	Utah	....	....	7,632
*Tip Top, S.	Ariz.	....	....	7,976
*Tombstone, G. S.	"	....	51,000	123,011
Yellow Jacket, S.	Nev.	....	14,704	28,956
Total amount of shipments to date				$3,070,712

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Thursday Evening, March 22.

Copper.—The principal feature during the week has been the rumor that upward of 7,000,000 pounds of Lake copper have been sold for export at a price reported to be 16 cents. We discuss the situation editorially, and need only add now that, previous to the transactions named, there have been sales of small lots of Lake at 17⅝@17½c., while transactions in other kinds of copper have been made on the basis of 15¼@15½c. How far the export sales will check the demoralization in other brands remains to be seen. It will certainly aid them materially. The latest English cables are £72@£72 5s. for Best Selected, and £65 10s.@£65 15s. for Chili Bars.

Tin.—The market has been more quiet, sales aggregating from 300 to 400 tons, closing at 22½c. spot for large lines of Straits, and 22¼@22⅝c. for jobbing lots. The shipments from the Straits for the first two weeks of the month were only 50 tons. England cables £97 5s. £97 10s.

Lead.—The only wholesale transaction of which we have been able to learn was the sale of 100 tons of Refined lead at 4·70c. Business is extremely dull and lifeless. The Richmond Company is accumulating a stock here that is not, probably, very far short of 2000 tons; but as yet its representatives have shown no disposition to place any of it on the market. In the West, the representative of the Horn-Silver and Omaha works must also be accumulating some lead, so that there seems little prospect for any upward movement in this metal, while some of the heaviest consumers are well supplied by recent purchases. England is unchanged at £13 10@£13 15s. for English Common.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

The market remains about the same, if any thing a shade weaker. Sales during the week were 290 tons of Refined at 4·25c. and 100 tons of Hard at 4·22½c.

Spelter.—There is a decidedly better feeling, and prices have been advanced, chiefly, it would appear, in consequence of a better demand in the West. Much of the business is done directly, and the quantities reaching the open market are therefore not large, since the import movement has entirely ceased. We quote 4·75@4·85c. for ordinary to good domestic brands. England cables £15 10s.@£15 15s.

Antimony.—Business has been quite active, about 150 casks changing hands. We quote 11c. for Cookson's and 10c. for Hallett's, the bulk of the stock being in dealers' hands.

Quicksilver.—The market during the week has been shaky and 36½@37c.—*San Francisco Commercial Herald.*

IRON MARKET REVIEW.

NEW YORK, Thursday Evening, March 22.

The British Board of Trade returns for the two first months of the year show the following movement to this country of iron and steel:

	To U. S.		All countries.	
	1883.	1882.	1883.	1882.
Pig-iron	40,133	58,574	165,078	195,310
Bar, angle, bolt, and rod	2,513	5,900	43,466	52,511
Railroad, of all sorts	11,623	51,032	156,515	151,621
Hoops, sheets, and plates	3,961	5,528	52,895	48,702
Tin plates	31,031	33,273	39,483	40,430
Old	7,535	22,472	11,485	26,639
Steel, unwrought	6,706	33,106	11,874	37,362

American Pig.—The lack of vim which we noted in our last has deepened into apathy, and beyond contracts for a few thousand tons, nothing has been done. Buyers show no desire whatever to take hold, and while the makers of well-known brands appear little affected, and firmly adhere to their figures, there is more irregularity in outside brands, and the market is weaker. We quote $22.50@$25 for ordinary to choice No. 1 Foundry; $21.50@$22.50 for No. 2; and $19.50@$20.50 for Gray Forge, of which sales aggregating about 1000 tons have taken place at low figures. Bessemer pig is quiet and dull, with quotations at $20@$21 for American at furnace, and $21.50@$22 nominally at tide-water for foreign. Spiegel is unchanged.

Scotch Pig.—We have nothing new to report in the way of business in Scotch pig. Arrivals foot up to 2500 tons, mostly sold previous to arrival. Sales have been very small. Freights are unchanged. We quote: Coltness and Langloan, $24.25@$24.50; Summerlee, $23.50@$24; and Eglinton, $21@$21.50. At the Wall Street Exchange, the following cable quotations were received to-day: Carnbroe, 55s. 3d.; Gartsherrie, 62s.; Summerlee, 62s. 3d.; Coltness, 64s. 6d.; Langloan, 64s. 9d.; Glengarnock, 55s.; and Eglinton, 49s. 6d. Warrants were 47s. 6d.

Rails.—Beyond a few sales of small lots, there is nothing to report. For such small quantities, $39 at mill is the ruling price, but it is probable that for large contracts, later delivery, less would be accepted; in fact, it is stated that recent large transactions have been on the basis of $38. Western mills are trying to get $42, but it is believed will take considerably less.

Old Rails.—Business has been quiet, with values unchanged, at $24@$24.50 for Ts.

Scrap.—Small sales have taken place at the range of $24@$24.50 ex ship.

Philadelphia. March 23.

Buyers are still holding off and restricting their purchases to small lots for current requirements. Quotations show no improvement as yet, and manufacturers and makers of pig-iron are generally disposed to accept all offers made, provided they are within safe reach of the selling prices.

Pig-Iron.—Transactions in pig since Monday have been mainly in forge iron and those of standard brands. A few lots of inferior have been sold as low as $18 at furnace and some at $18.50, but $19 is claimed as the average selling price for good brands. Special brands are selling at $19.50@$20, and one or two as high as $20.50; no special brands being offered. Manufacturers are preparing to purchase more freely than they have done heretofore, as their stocks are low, and prices are not likely to decline any

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	March 17.		March 19.		March 20.		March 21.		March 22.		March 23.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	...	...	...	...	3.00	2.70	2.90	...	2.95	2.90	...	...	1,300
Amie Con., Co.	...	...	.24	...	.25	.23	.24	...	.26	.24	...	...	14,400
Argenta, Ne.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bar. & Walker, Ut.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bassick, Co.	11.50	10.00	11.50	11.00	...	...	10.50	...	10.88	...	...	...	1,065
Belle Isle, Ne.	...	...	...	...	...	...	.53	.52	.55	...	...	...	1,000
Bodie Cons., Ca.	.90	...	.85	...	.80	...	.90	...	.85	...	...	...	1,260
Breece, Co.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bulwer, Ca.	.95	...	.95	...	.90	...	.92	.90	.90	.85	...	...	2,800
California, Ne.	...	...	...	...	.06	.05	.05	...	.05	.04	...	...	2,780
Cal. & Hecla, Mich.	...	...	...	...	...	...	...	...	...	...	...	...	...
Caribou Con., Co.	...	...	...	...	...	...	...	...	...	...	...	...	...
Chrysolite, Co.	1.35	...	1.35	1.30	1.25	1.30	1.35	...	1.35	1.30	...	...	1,320
Climax, Co.	...	...	...	...	.19	...	...	...	...	...	...	...	100
Cons. Va., Ne.	.50	...	.48	...	.50	.49	.50	...	.48	.45	...	...	3,775
Deadwood-Terra, Dk.	...	...	...	...	...	...	...	...	...	...	...	...	...
Dunkin, Co.	...	...	...	...	...	...	...	...	.30	.28	...	...	200
Eureka Cons., Ne.	...	...	7.25	6.75	6.88	6.50	5.50	...	5.75	5.50	...	...	1,040
Excelsior, Ca.	...	...	...	...	...	...	...	...	...	...	...	...	...
Father de Smet, Dk.	...	...	...	...	...	...	...	...	...	...	...	...	...
Findley, Ga.	...	...	...	...	...	...	...	...	...	...	...	...	...
Gold Stripe, Ca.	...	...	.07	...	...	...	.07	...	.08	.07	...	...	3,000
Gould & Curry, Ne.	...	...	...	...	...	...	...	...	...	...	...	...	...
Grand Prize, Ne.	.45	...	...	...	...	...	...	...	...	...	...	...	100
Great Eastern, Dk.	...	...	.03	...	...	...	...	...	...	...	...	...	700
Green Mountain, Ca.	...	...	...	...	...	...	...	...	.79	.78	...	...	500
Hale & Norcross, Ne.	...	...	...	...	...	...	...	...	...	...	...	...	...
Hall-Anderson, N. S.	...	...	...	...	...	...	...	...	...	...	...	...	...
Hibernia, Co.	...	...	...	...	.03	...	...	...	...	...	...	...	100
Homestake, Dk.	...	...	...	...	15.75	...	...	...	16 00	...	...	...	60
Horn-Silver, Ut.	...	...	7.88	...	...	...	8.00	...	8.00	...	...	...	275
Hukill, Co.	.15	...	.15	...	.16	...	...	...	...	...	...	...	1,300
Independence, Ne.	...	...	...	...	.40	...	...	...	.43	.41	...	...	700
Iron Silver, Co.	3.00	...	2.75	...	...	...	2.80	...	...	...	...	...	800
La Plata, Co.	...	...	...	...	...	...	...	...	...	...	...	...	...
Leadville C., Co.	.71	...	.72	...	.73	.72	.70	...	.72	...	...	...	2,100
Little Chief, Co.	.38	...	.39	.38	...	...	.38	...	.38	...	...	...	1,800
Little Pittsburg, Co.	.70	.65	.71	...	...	...	.70	...	...	...	...	...	1,650
Martin White, Ne.	...	...	...	...	...	...	...	...	.45	...	...	...	200
Moose, Co.	...	...	...	...	...	...	...	...	...	...	...	...	...
Navajo, Ne.	...	...	...	...	3.40	...	3.50	...	3 50	...	...	...	625
Northern Belle, Ne.	9.63	...	9.63	...	9.63	9.50	9.75	...	9.75	9.63	...	...	560
North Belle Isle, Ne.	...	...	...	...	...	...	...	...	...	...	...	...	...
Ontario, Ut.	24.50	24.00	...	...	23.75	...	24.00	...	24.00	...	...	...	155
Ophir, Ne.	...	...	...	...	...	...	...	...	...	...	...	...	...
Plumas, Ca.	...	...	...	...	...	...	...	...	...	...	...	...	...
Prussian, Colo.	...	...	...	...	...	...	...	...	...	...	...	...	...
Quicksilver Pref., Ca.	...	...	...	...	...	...	...	...	44.00	...	...	...	100
" Com., Ca.	...	...	...	...	...	...	8.38	...	...	...	...	...	100
Rising Sun, Ca.	.05	...	...	...	.05	...	...	...	.05	...	...	...	3,000
Robinson Cons., Co.	.78	.72	.70	.62	.67	.63	.68	.65	.75	.69	...	...	43,300
Savage, Ne.	...	...	...	...	...	...	...	...	...	...	...	...	...
Sierra Grande, N. M.	2.75	2.55	2.75	2.45	2.65	2.50	2.75	2.45	2.50	2.40	...	...	15,100
Sierra Nevada, Ne.	3.00	...	...	...	...	...	...	...	...	...	...	...	300
Silver King, Ar.	...	...	10.88	...	10.88	...	...	...	...	...	...	...	55
Spring Valley, Ca.	...	...	...	...	...	...	...	...	...	...	...	...	...
Standard, Ca.	...	...	...	...	6.88	...	6.63	6.50	6.50	...	...	...	350
Stormont, Ut.	...	...	...	...	...	...	...	...	...	...	...	...	...
Tip Top, Ar.	...	...	...	...	...	...	...	...	...	...	...	...	...
Tombstone, Ar.	...	...	...	...	...	...	...	...	...	...	...	...	...
Vizina, Ar.	...	...	...	...	...	...	...	...	...	...	...	...	...
Yellow Jacket	...	...	...	...	2.25	...	...	...	...	...	...	...	600
	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	March 17.		March 19.		March 20.		March 21.		March 22.		March 23.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance.	...	...	...	...	...	...	...	...	...	...	...	...	...
Albion, s. L.	...	...	...	...	...	...	...	...	...	...	...	...	...
Alta-montana, G.	...	...	...	...	...	...	.10	.08	...	...	...	...	4,300
Am. Flag, s.	.03	...	...	...	...	...	...	...	...	...	...	...	100
Barcelona, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bear Creek.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bechtel Con., G.	...	...	...	...	...	...	...	...	...	...	...	...	...
Best & Bicher, G. s.	...	...	...	...	4.13	...	...	...	...	...	...	...	100
Big Pittsburg, s. L.	.17	...	...	...	.18	...	.12	.11	.14	...	...	...	1,000
Bradshaw, s.	...	...	...	...	...	...	...	...	.30	...	...	...	500
Buckeye	...	...	...	...	...	...	...	...	...	...	...	...	...
" pref.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bull-Domingo, s. L.	...	...	...	...	...	...	...	...	...	...	.07	...	400
Bye and Bye.	...	...	...	.02	...	.02	...	.02	...	.02	...	...	800
Calaveras, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
C'lav'r's W. & M. Co.	...	...	...	...	...	...	...	...	...	...	...	...	...
Cal., B. H., G.	...	...	...	...	.80	...	...	...	...	...	...	...	200
Carbonate Hill, s. L.	...	...	...	...	1.30	...	...	...	...	...	...	...	200
Catskill.	...	...	...	...	...	...	...	...	...	...	...	...	...
Central Ariz'na, s.	...	...	.37	.35	.36	...	...	...	.36	.35	...	...	900
Chaparral.	...	...	...	...	...	...	...	...	...	...	...	...	...
Cherokee, G.	.08	...	.05	.04	.05	...	.04	...	...	...	...	...	3,800
Cons. Imp'ri'l, G. s.	...	...	...	...	...	...	.08	...	...	...	...	...	500
Con. Pacific, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
Crowell, G.	...	...	.06	...	.07	...	...	...	.05	...	...	...	5,000
Dahlonega, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
Decatur.	.07	.06	.08	...	.08	.07	.08	.07	.07	...	...	...	28,900
Durango, G.	.09	...	.08	...	.08	...	...	...	...	...	...	...	1,200
Eastern Oregon.	...	...	.75	...	...	...	...	...	...	...	...	...	200
Elko Cons.	.16	.14	.15	.13	.10	...	.12	...	.13	.12	...	...	7,100
Enterprise.	.18	.16	.19	.16	.20	.19	.19	.18	.20	.19	...	...	28,900
Fannie Barret.	...	...	...	...	...	...	...	...	2.25	2.20	...	...	400
Gold Placer, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
Goodshaw, G.	...	...	...	...	...	...	.05	.04	.05	...	...	...	1,500
Granville, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
Harlem M. & M. Co.	1.40	1 35	1 40	1.35	1.40	1.35	1.40	1.35	1.40	1.55	...	...	8,500
Hortense, s.	...	...	...	...	...	...	...	...	...	...	...	...	...
Lacrosse, G.	.18	.15	.16	.15	.16	...	.14	...	.14	...	...	...	14,600
Mariposa Pref., G	...	...	...	...	...	...	...	...	...	...	...	...	...
" Com., G	...	...	...	...	...	...	...	...	...	...	...	...	...
Mexican, G. s.	...	...	...	...	4.13	4.00	3.80	...	...	...	...	...	1,160
Miner Boy.	...	...	...	...	...	...	...	...	.02	...	...	...	600
Mono.	...	...	...	...	...	...	...	...	...	...	...	...	...
North Standard, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
N. Horn-Silv'r, s. L.	...	...	...	...	...	...	...	...	...	...	...	...	...
Ori'n't'l & Miller, s.	.14	...	.14	.13	.14	.13	.16	.15	.17	.15	...	...	16,200
Quartz Creek.	...	...	...	...	...	...	...	...	...	...	...	...	...
Rappahannock, G.	...	...	...	...	.09	...	.09	...	.09	...	...	...	3,500
Red Elephant, s.	.06	...	...	...	06	...	...	...	...	...	...	...	1,100
Ruby, of Arizona.	...	...	...	...	...	...	...	...	...	...	...	...	...
Silver Cliff, s.	...	...	...	...	...	...	...	...	...	...	...	...	...
Sonora Con.	.45	.44	.43	.39	.42	.34	.41	.39	.41	.38	...	...	41,900
South Bodie, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
South Bulwer, G.	...	...	...	...	...	...	...	...	...	...	...	...	...
South Hite.	...	...	.12	...	.13	.09	.14	...	...	...	...	...	9,700
South Pacific.	.08	.07	.08	...	.08	.07	.08	.07	.08	...	...	...	10,700
State Line	...	...	...	...	...	...	...	...	...	...	...	...	...
" Nos. 1 & 4, s.	.02	...	.04	...	.04	...	...	...	...	...	...	...	700
" Nos. 2 & 3, s.	.06	...	.06	...	.07	...	...	...	.06	...	...	...	2,000
Sutro Tunnel.	...	...	.21	...	.21	.20	.21	...	.20	...	...	...	1,500
Taylor-Plumas.	.18	...	.17	...	.18	...	.18	.17	.18	...	...	...	15,300
Unadilla, s.	...	...	...	...	...	...	...	...	...	...	...	...	...
Union Cons., G. s.	5.50	5.13	...	...	5.25	5 13	...	...	4.75	4.70	...	...	730
Vandewater.	...	...	...	...	...	...	.20	...	...	...	...	...	100
Washington.	...	...	...	...	...	...	.07	...	.08	...	...	...	600

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 108,470. Non-dividend shares sold, 215,490.

BOSTON MINING STOCKS.

	March 16.		March 17.		March 19.		March 20.		March 21.		March 22.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.	2.00	...	...	...	...	...	2 13	...	...	...	...	...	150
Atlantic.	...	...	...	...	13.00	...	...	...	...	...	...	...	15
Aztec.	...	...	...	...	...	...	...	...	...	...	...	...	...
Best & Bel.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bodie Con.	...	...	...	...	.90	...	...	...	...	...	...	...	100
Bonanza D.	...	...	2.50	...	...	...	2.38	...	2.50	...	2.50	...	925
Bruns. Ant.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bulwer.	.92	...	...	...	...	...	...	...	...	...	...	...	100
California.	...	...	...	...	...	...	...	...	...	...	...	...	...
Cal. & Hec.	240	...	...	...	...	...	240	...	240	...	240	...	97
Carbon. Hill	...	...	...	...	...	...	...	...	...	...	...	...	...
Catalpa.	.60	...	.60	52½	.50	.45	.47½	.45	.47½	.45	.46	.45	14,300
Central Ariz	.35	...	...	...	...	...	...	...	...	...	...	...	200
Cherryfield.	...	...	...	...	...	...	...	...	...	...	...	...	...
Chrysolite.	...	...	...	...	...	...	...	...	...	...	...	...	...
Con. V'ginia.	...	...	...	...	...	...	...	...	...	...	...	...	...
Copp'r Falls	...	...	...	...	...	...	...	...	...	...	...	...	...
Crescent.	.28	...	.27½	...	.25	.23	.22½	.22	...	...	.22½	.20	3,500
Cumberl'd.	.60	...	.60	...	.60	...	...	...	...	...	...	...	1,900
Decatur.	...	...	...	...	.08	...	...	...	...	...	...	...	500
Deer Isle.	...	...	...	...	.08	...	...	...	...	...	...	...	500
Denver City	...	...	...	...	...	...	...	...	...	...	...	...	...
Douglas.	...	...	...	...	.80	...	...	...	...	...	...	...	200
Duncan.	...	...	...	...	...	...	...	...	...	...	...	...	...
Dunkin.	...	...	...	...	...	...	...	...	...	...	...	...	...
Empire.	.20	...	...	...	...	...	...	...	...	...	19	...	700
Eureka Con.	...	...	...	...	...	...	7.00	...	...	...	...	...	20
Franklin.	11.50	...	11.50	11.00	...	...	11.25	11.13	11.38	...	12.13	12.00	290
Gila County	...	...	...	...	...	...	...	...	...	...	...	...	...
Hancock G.	...	...	...	...	...	...	9.00	...	...	...	9.00	...	200
Harshaw.	...	...	...	...	...	...	...	...	...	...	...	...	...
Huron.	...	...	...	...	...	...	...	...	...	...	...	...	...
Indian Q'n.	...	...	...	...	1.38	...	...	...	...	...	...	...	100
Little Pitts.	...	...	...	...	...	...	...	...	...	...	...	...	...
Mammoth.	...	...	...	...	...	...	...	...	...	...	...	...	...
Mass. & N.M.	.10	...	.10	...	.10	...	.10	.09	...	...	.10	.09	29,400
Milton.	...	...	...	...	...	...	...	...	...	...	...	...	...
Napa.	...	...	...	...	...	...	...	...	...	...	...	...	...
National.	1.00	...	...	...	...	...	...	...	1.00	...	1.00	...	275
North. Belle	...	...	...	...	...	...	...	...	...	...	...	...	...
Osceola.	...	...	29.50	...	29.50	...	...	...	29.50	...	29.50	...	104
Penn-Breck.	...	...	...	...	...	...	...	...	...	...	...	...	...
Pewabic.	6.50	...	6.50	...	...	...	...	...	...	...	6.00	...	500
Pine Tree.	...	...	...	...	...	...	...	...	...	...	...	...	...
Plymouth.	.21	...	...	...	...	...	.20	...	...	...	.20	...	...
Quincy.	48.00	...	...	...	48.50	...	49.50	...	...	...	...	...	40
Ridge.	...	...	...	...	...	...	...	...	...	...	...	...	...
Robinson.	.81	...	...	...	...	...	...	...	...	...	...	...	100
San Pedro.	.62½	.57½	.55	...	...	...	.55	...	...	...	...	...	900
S'ra Nevada	2.60	...	...	...	...	...	...	...	...	...	...	...	30
S'ra Grande	...	...	2.75	...	...	...	2.50	...	...	...	...	...	200
Silver Islet.	...	...	...	...	3.06	...	3.00	...	...	...	...	...	150
Silver King.	10.88	...	...	...	...	...	...	...	...	...	...	...	25
Simpson Gd	...	...	.05	...	...	...	...	...	...	...	...	...	2,000
So. Pacific.	...	...	...	...	.07	...	.07	...	...	...	.07	...	1,700
Standard.	...	...	...	...	...	...	...	...	...	...	...	...	...
State Line.	...	...	...	...	...	...	...	...	...	...	...	...	...
Nos. 2 & 3.	...	...	...	...	...	...	...	...	...	...	...	...	...
Sullivan.	1.00	...	...	...	.93¾	...	...	...	...	...	...	...	200
Sutro Tun.	.20	...	.21	...	...	...	.22	...	...	...	.22	...	1,100
Sycamore.	...	...	...	...	...	...	...	...	...	...	...	...	...
Twin Lead.	.05	...	.05	...	...	...	...	...	...	...	...	...	2,000
Vizina.	...	...	...	...	...	...	...	...	...	...	...	...	...

PHILADELPHIA MINING STOCKS.

	March 16.		March 17.		March 19.		March 20.		March 21.		March 22.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American.	.19	.18	.19	.17	.18	...	.18	...	.17	...	.16	...	30,300
Argent.	...	...	...	...	...	...	...	...	...	...	...	...	...
Arizona So.	...	...	...	...	...	...	...	...	...	...	...	...	...
Aztec.	.04	...	.04	...	...	...	.04	...	...	...	.03	...	6,700
Battle Mt.	...	...	...	...	...	...	...	...	...	...	...	...	...
Black Sul.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bodie.	.03	.02	.03	...	.04	...	.03	...	...	...	...	...	23,800
Buena.	...	...	...	...	...	...	...	...	...	...	...	...	...
California.	...	...	...	...	...	...	...	...	...	...	...	...	...
Calista.	.09	...	...	...	...	...	...	...	.10	.09	.10	...	1,000
Cincinnati.	.35	...	.32½	...	.30	...	.30	...	.30	...	.32½	...	14,600
Comprom'e.	...	...	...	...	...	...	...	...	...	...	...	...	...
Contention.	...	...	...	...	...	...	...	...	...	...	...	...	...
Dauntless.	...	...	.03	...	.03	...	.03	...	...	...	...	...	11,000
Del Monte.	...	...	...	...	...	...	.11	...	...	...	.12	...	6,900
Denver City	.12	...	...	...	...	...	.01	...	...	...	...	...	5,000
Fairview.	...	...	...	...	...	...	...	...	...	...	...	...	...
Eureka.	...	...	...	...	...	...	...	...	...	...	...	...	...
Girard.	.14	...	.15	.14	.13	...	.15	...	.18	.12	.12	.10	31,700
Golconda.	...	...	...	...	...	...	...	...	...	...	...	...	...
Golden Age.	...	...	...	...	...	...	...	...	...	...	...	...	...
Governor.	.10	...	...	...	.10	...	.09	...	.09	.08	...	...	17,700
Grand Uni'n	.18	...	.18	...	.18	...	...	...	...	...	.16	...	2,100
Gunnison.	...	...	...	...	...	...	...	...	...	...	...	...	...
Hancock.	...	...	...	...	...	...	...	...	...	...	...	...	...
Iowa Gulch.	.09	.08	.08	.07	.08	...	.08	...	.08	.07	.07	...	25,600
King Bul'on	...	...	...	...	...	...	...	...	...	...	...	...	...
Ledger Con.	...	...	...	...	...	...	...	...	...	...	...	...	...
Little Dia'd.	...	...	...	...	...	...	...	...	...	...	.05	...	4,000
Little Maud	...	...	...	...	...	...	...	...	...	...	...	...	...
L'y & D'y Hl	...	...	...	...	...	...	...	...	...	...	...	...	...
McCullough	...	...	...	...	...	...	...	...	...	...	...	...	...
Magnolia.	...	...	.01	...	.01	...	...	...	...	...	...	...	2,000
Montana	...	...	...	...	...	...	...	...	...	...	...	...	...
Mt. Lincoln.	...	...	...	...	...	...	...	...	...	...	...	...	...
Mt. Sheridan	.04	...	.04	...	.05	...	.05	...	.05	...	...	...	16,500
National.	...	...	...	...	...	...	...	...	...	...	...	...	...
Orion.	...	...	...	...	...	...	...	...	...	...	...	...	...
Orion Pref.	...	...	...	...	...	...	...	...	...	...	.10	...	1,000
Palmetto E.	...	...	...	...	...	...	...	...	...	...	...	...	...
Pembina.	.20	...	...	...	.20	...	.19	...	.19	...	.19	...	6,700
Penn-Breck.	.13	...	.14	.13	.14	.13	.14	.13	.13	.12	.12	.11	48,200
Permanent.	...	...	...	...	...	...	...	...	.01	...	...	...	3,000
Pizarro.	...	...	.01	...	...	...	...	...	...	...	...	...	2,000
Pizarro Ex.	...	...	...	...	...	...	...	...	...	...	...	...	...
Potosi.	...	...	...	...	...	...	...	...	...	...	...	...	...
Rara Avis.	...	...	...	...	.50	...	...	...	...	...	.40	...	1,000
Rara Avis E.	.08	...	.08	...	.09	...	.09	.08	.09	...	.09	...	25,400
Record.	...	...	...	...	...	...	...	...	...	...	...	...	...
Rice Pion'r.	...	...	...	...	...	...	...	...	...	...	...	...	...
San Pedro.	...	...	...	...	...	...	...	...	...	...	...	...	...
Sierra G'nde	2.70	...	2.70	2.47½	2 70	2.50	2.60	...	2.62½	2.50	2.55	2.45	12,720
Silver Cord.	...	...	1.35	...	...	...	...	...	...	...	1 45	...	1,100
Silv'r Plume	...	...	...	...	...	...	...	...	...	...	...	...	...
Silver Rock	...	...	...	...	...	...	...	...	...	...	...	...	...
Sovereign.	...	...	...	...	...	...	...	...	...	...	...	...	...
Standard.	...	...	...	...	...	...	...	...	...	...	...	...	...
Sultana.	.04	.03	.04	.03	.04	...	.04	...	.04	...	.04	...	20,900
Sutro Tun'l.	...	...	...	...	...	...	...	...	...	...	...	...	...
Tombstone.	.85	...	.85	...	.85	...	.86	...	.85	...	...	...	6,300
Tranquilli'y	...	...	...	...	...	...	...	...	...	...	...	...	...
Victor.	...	...	...	...	...	...	...	...	...	...	...	...	...
Yale Mt.	...	...	...	...	...	...	...	...	...	...	...	...	...

further. Wants will not be anticipated very far ahead, as the volume of demand is doubtful. Foundry is moving in small lots at $24@$25, with one or two special brands about this figure. No. 2 iron is to be had at $22.50@$23. White and mottled lots are heard of occasionally at exceptionally low figures. Buyers are more disposed to come into the market just now than they have been for several weeks, but there is still an element of doubt manifesting itself as to the future course of the market.

Muck Bars.—A few small transactions in Muck Bars were reported at $36@$36.50, though sales have been made below these figures. Charcoal Blooms are moving along in a slow way at $64; Anthracite, $55 Occasional concessions are made from these figures.

Merchant Bar.—Finished iron is in a very unsettled condition. Transactions are restricted to small lots. Buyers look for a further weakness, but manufacturers claim there is nothing in iron at present figures. Western competition has manifested itself more freely within a few days, and lots of refined are offered in this market at 2·10@2·20c. Buyers are disposed to defer large engagements, and take advantage of such offers. Card rates, 2·30c. Nothing outside of small lots from store command this figure. Average prices are 2·20@2·25c. Large lots, 2·15@2·20c. Common iron is selling from 2·15c. down to 2c. Pittsburg iron is offered there at 1·90c. plus freight. This new competition is creating a good deal of unrest among buyers, who are naturally restricting demand until bottom is reached. Skelp iron is fairly active at 2·15@2·30c. A few transactions in wrought pipes and tubes have been closed at 67½@70c. off pipes and 55c. off tubes.

Sheet-Iron is moving in small lots at 4@4½c., with good concessions for large orders, which are now coming along.

Nails are quoted bottom at $3.15 for car-load lots, to $3.20@$3.30 for small lots, though offers at $3.10 would be accepted, and buyers were not willing to take hold even at this figure, in view of the possible excess of supply due to full time in the West. Pittsburg nails have been offered in New York at $3 at mill.

Structural Iron.—A leading firm here has secured a contract for the construction of a two-mile bridge near Harrisburg. The contract is a large one, and was taken at satisfactory figures. Quotations in small lots are given at 2½c. for Angles; 3¼c. for Tees; 3½c. for Beams and Channels. The outlook is favorable for an active demand, but buyers are very slow to place orders unless concessions are extended.

Plate and Tank.—The volume of business since Monday in Plate and Tank has not been large. Common plates are 2½c.; Shell is quoted at 3½c., and Flange at 4½c., but large orders can be placed at shaded figures.

Steel Rails.—There is much difference of opinion as to inside steel rail quotations. One establishment here quotes $41, but would take very nearly $3 less. Average quotations for small lots are $39@$40. Negotiations are in hand for large lots, and rumor states that probable figures will be near $38.

Old Material.—English Tees are quoted at $24.50. Transactions small. Double-Heads are offered for shipment at $27, tide-water delivered.

Scrap.—A few sales of Scrap have been made at $27.50 for selected No. 1, ex yard. Buyers are purchasing for immediate requirements only. No. 2 is selling all the way from $25@$26.50, according to quality and location.

Cleveland. March 21.

Our pig-iron market has more life than at last report, but values are unchanged beyond the advance of 50c. to $1 made by Southern furnaces. Compared with January 1st, 1883, furnace yards show considerably smaller stocks, especially of good No. 1 Foundry. Consumers are supplied for from three to six weeks, but are inclined to purchase more liberally than of late.

The prices for Lake Superior ores for the coming season are being fixed on the basis of $8.50 on docks here for Republic. In this branch of the trade, there is a marked inquiry, but few sales have thus far been consummated. We quote:

No. 1 Bessemer	$23.50@$24.00
" Foundry, all ore	22.50@ 23.50
" Foundry, cinder mixture	22.00@ 23.00
" Soft Foundry	21.50@ 23.00
" Open silvery	21.50@ 22.00
Mill Irons	19 50@ 22.00
Four months, f. o. b. cars furnaces:	
Nos. 1 and 2 Charcoal	26 50@ 27.50
Nos. 3, 4, 5, and 6 Charcoal	27.00@ 28.00
Hanging Rock Charcoal	23.00@ 26.50
Strictly Cold-Blast Charcoal	28.50@ 31.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	8.50@ 10.00
Hematite "	6.00@ 8 00

COAL TRADE REVIEW.

New York, Friday Evening, March 28.

Anthracite.

On Saturday, the Pennsylvania Coal Company issued the following circular for Pittston coal at Newburg:

Lump	$3.95
Steamer	3.95
Grate	3.90
Egg	3.95
Stove	4.05
Chestnut	4 15
Pea	2.85

And this was followed promptly by the other companies, who agreed upon the following opening prices:

Broken, f. o. b.	$3.90
Egg, "	4.00
Stove, "	4.20
Chestnut, "	4.30

These figures are a little higher than the opening prices of last year, and are slightly above the equivalent of the Pennsylvania Coal Company's list, taking into account, on the one hand, 20 cents off to contractors, and on the other hand, a difference in price of 15 cents here and in Newburg.

It can not be said that the announcement of these figures has as yet produced any effect; in fact, we hear that there have been sales during the week at low figures. Buyers have not shown any particular eagerness to take hold at the new prices. How long they will be able to hold off remains to be seen, but their position will be strengthened unless the policy of restricting is continued for some time to come. It has not yet been definitely settled whether there will be full or half-time next week or the week following.

Mr. John H. Jones, accountant, has published the following statement of the anthracite coal tonnage for the month of February, compared with the same period last year:

	February 1883.	For year 1883.	For year 1882.	Differ'ce.
Phila. & Reading RR.	475,143	940,653	772,654	I. 167,999
Lehigh Valley RR.	*401,388	832,965	696,968	I. 135,996
Central RR. of N. J.	280,329	584,812	493,517	I. 91,295
Del., Lack. & W. RR.	308,626	646,887	552,456	I. 94,431
Del. & Hud. Canal Co.	†194,861	442,586	409,740	I. 32,846
Pennsylvania RR.	165,160	327,318	302,023	I. 25,295
Penna. Coal Co.	90,551	193,304	163,025	I. 30,279
N. Y., L. E. & W. RR	21,636	45,209	48,769	D. 3,559
Total.	1,937,996	4,013,738	3,439,154	I. 574,584

* This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 5402 tons.

† In addition there were 39,279 tons transported from mines by Delaware & Hudson Canal Company during February, which are included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, February 28th, 1883, was 575,695 tons; on January 31st, 1883, 616,759 tons; decrease, 41,064 tons.

Bituminous.

The trade is exceedingly dull, more lifeless, in fact, than it has been for many years at this season. Though prices are low, consumers insist upon concessions even for the small quantities they buy under pressure of actual needs. Freights have declined sharply during the past ten days, and have reached a figure that must leave but little for the boatmen.

The only transaction of any importance that we hear of in the way of contracts is the closing of a 10,000 ton contract with the Fitchburg Railroad, secured by a company mining George's Creek Cumberland, at a low figure. We quote nominally for Cumberland $4.45@$4.70, according to quality, and Clearfield $4.40@$4.65.

SUPPLIES.

Phosphor-Bronze Wire.

Stubs gauge.	Diameter, in.	Weight per mile, lbs.	Breaking strain, lbs.	Price per pound, cents.
16	·065	About 66	About 270	40
17	·058	" 53	" 220	41
18	·049	" 40	" 165	42

Discounts: On orders of 100 pounds and less than 500 pounds, 5 per cent. On orders of 500 pounds and over, 10 per cent.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended March 17th, and year from January 1st:

Tons of 2240 lbs.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	54,456	610,255	47,158	596,244
D. L. & W. RR. Co.	70,327	796,587	61,065	757,318
Penna. Coal Co.	14,235	202,736	12,071	168,707
L. V. RR. Co.	23,531	190,062	28,277	199,886
P. & N. Y. RR. Co.	3,682	36,413	2,534	34,257
C. RR. of N. J.	37,923	404,255	31,637	402,516
North & West Br. RR.	15,137	108,997	.....	.....
	219,281	2,349,305	182,742	2,158,928
Lehigh Region.				
L. V. RR. Co.	78,339	813,316	69,401	761,072
C. RR. of N. J.	34,377	363,098	27,443	332,378
S. H. & W. B. RR.	779	3,643	.....	11,273
	113,495	1,180,057	96,844	1,104,723
Schuylkill Region.				
P. & R. RR. Co.	103,283	1,130,287	91,562	1,023,903
Shamokin & Lykens Val.	25,205	243,723	8,120	194,604
	128,488	1,374,010	99,682	1,218,507
Sullivan Region.				
St Line&Sul.RR.Co.	1,034	11,861	989	9,879
Total	462,298	4,915,233	379,257	4,492,037
Increase	.....	423,196	.....	.....
Decrease	.....	.....	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Horsford's Acid Phosphate

In Sick Headache.

Dr. N. S. READ, Chicago, says: "I think it is a remedy of the highest value in many forms of mental and nervous exhaustion, attended by sick headache, dyspepsia, and diminished vitality."

ASSESSMENTS.

San Francisco, March 5, 1883.

THE BODIE CONSOLIDATED MINING COMPANY has levied assessment No. 2 of FIFTY CENTS PER SHARE, delinquent April 16th. Sale day, May 16th.

GEORGE W. SESSIONS, Secretary *pro tem.*

TIP TOP SILVER MINING COMPANY.

Location of principal place of business, San Francisco, California.

Location of works, Yavapai County, Arizona Territory.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 8th day of March, 1883, an assessment (No. 5) of TWENTY-FIVE (25) CENTS per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the Secretary, at the office of the company, Room 44, Nevada Block, No. 309 Montgomery street, San Francisco, California, on all certificates of stock issued at San Francisco, and at the Farmers' Loan and Trust Company, No. 26 Exchange Place, New York City, on all certificates issued at New York.

Any stock upon which this assessment shall remain unpaid on MONDAY, the SIXTEENTH (16th) day of APRIL, 1883, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the FOURTEENTH (14th) day of MAY, 1883, to pay the delinquent assessment, together with cost of advertising and expenses of sale.

By order of the Board of Directors.

HENRY DEAS, Secretary.

Office, Room 44, Nevada Block, No. 309 Montgomery street, San Francisco, California.

ASSAYERS' SUPPLIES.

(Established 1848.

Balances and Weights, Furnaces, Scorifiers, Cupels, Crucibles, Tongs, etc.

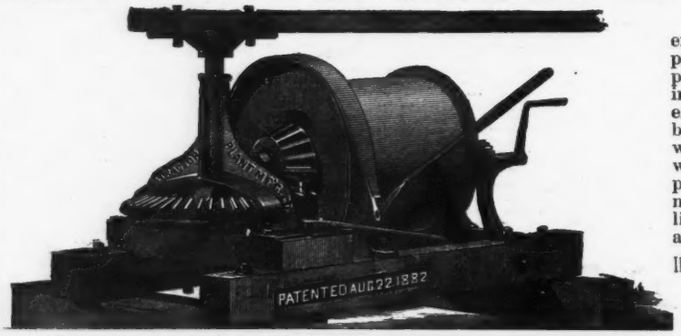
A LARGE STOCK. Also

CHEMICAL APPARATUS OF ALL KINDS.

Trial orders solicited. E. B. BENJAMIN,

6 Barclay and 12 Vesey Sts., New York.

DERRICK HORSE-POWER FOR MINERS AND BUILDERS.



This is a horse-power designed principally for mining purposes or raising building material in the erection of high buildings. A horse will raise a bucket weighing 600 to 700 pounds 75 feet per minute. Is small, light, easily handled and durable.

INGERSOLL ROCK DRILL CO.,

AGENTS,

10½ Park Place, N. Y.

THE CONTRACTORS' PLANT MFG. CO., 129 ERIE STREET, BUFFALO, N. Y